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POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

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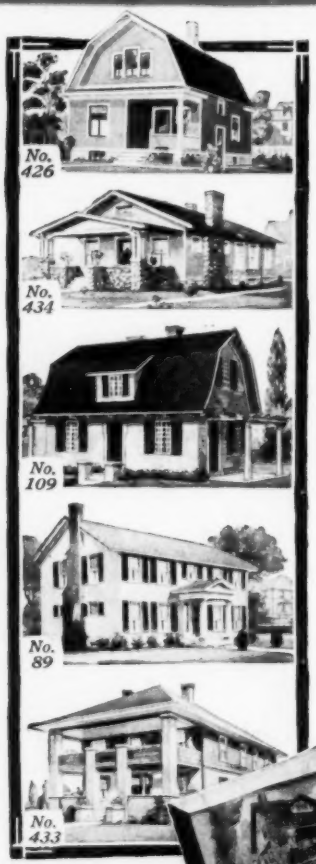
See Page 675

HARRIS HOMES



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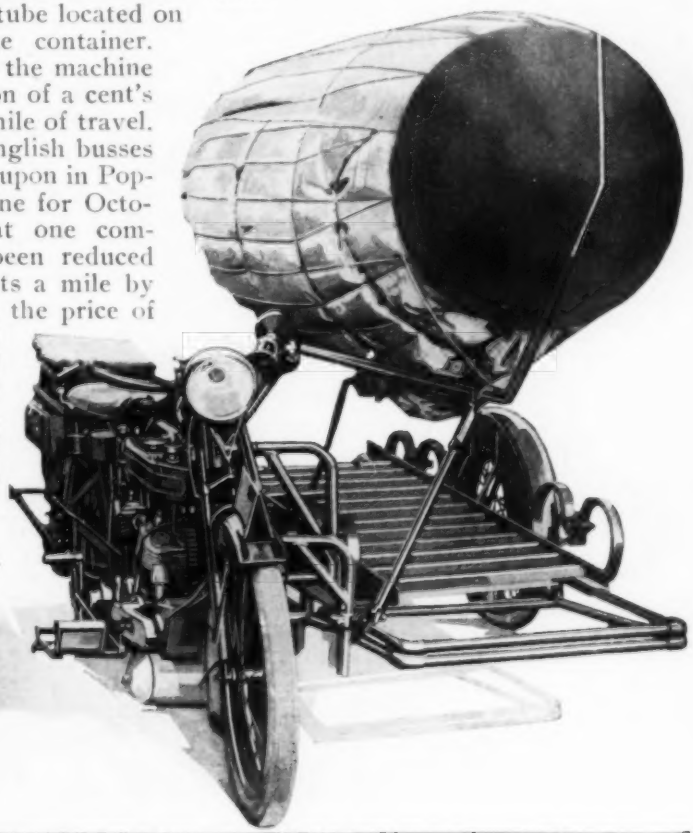
Vol. 28 NOVEMBER, 1917 No. 5

Motorcycle Runs on Gas Instead of Gasoline

THE use of illuminating gas for fuel, which has been undertaken as a war-time expedient for English busses and other cars, may very possibly become a permanent practice that will work revolutionary changes in the motor-vehicle field. The construction of a motorcycle that effects a great saving in fuel costs by using gas instead of gasoline, is one of the latest steps in this direction. A large gas bag, composed of fabric inclosed in a rope mesh, is supported by a steel frame above a sidecar and supplies fuel to the motorcycle engine through a tube located on the under side of the container. Tests have shown that the machine consumes only a fraction of a cent's worth of fuel for each mile of travel.

In the case of the English busses which were commented upon in Popular Mechanics Magazine for October, reports show that one company's fuel cost has been reduced from nine to three cents a mile by using illuminating gas, the price of gasoline being figured at 52 cents a gallon and gas at 60 cents per 1,000 cu. ft. These busses are equipped with 40-hp. engines and on their upper decks are flexible gas holders with a capacity of 600 cu. ft. each. It is said that no alteration of the carburetor is necessary beyond employing a valve in the air-intake pipe to enable the driver to regulate the air supply. In Edinburgh, Scotland, gas-driven busses have also been employed with satisfactory results. Much thought is being given to providing more satisfactory gas containers. It has been predicted that if this problem can be solved, gas will come into quite general use for motor cars.



A Motorcycle That Burns Illuminating Gas Instead of Gasoline, Consuming Only a Fraction of a Cent's Worth of Fuel per Mile, According to Tests: The Conical Metal End over the Gas Container Enables the Latter to Retain Its Shape in Spite of Wind Pressure. The Sidecar is Well Suited to War-Time Ambulance Service

VISIONS IN THE SKY AT PRZEMYSL

How an Ancient Miracle, Reproduced by the Aid of Modern Science, Affected the Fortunes of Two Nations

By J. E. MURPHY

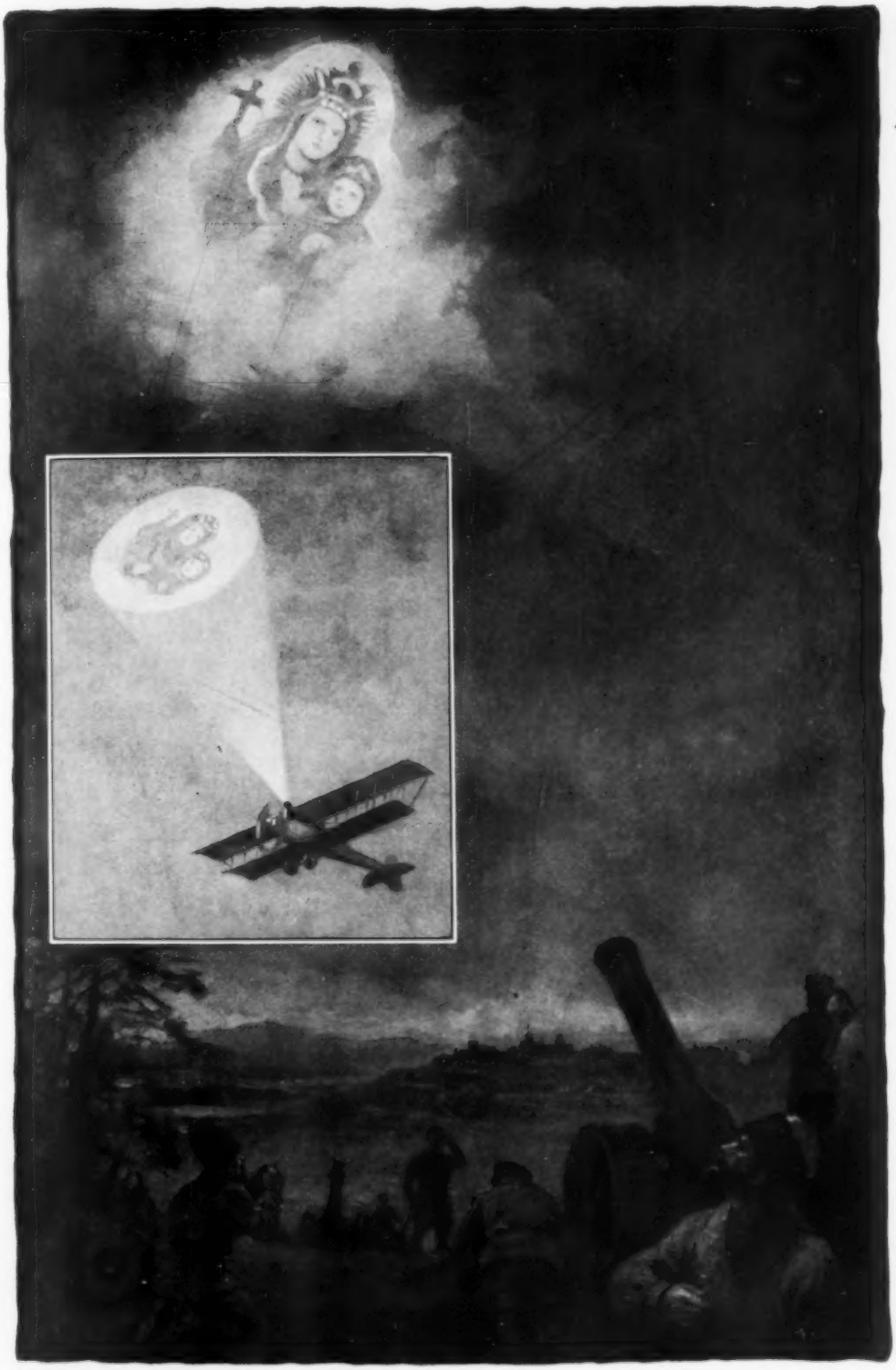
TALES of visions seen in the sky above Przemysl during the series of terrific assaults that ended in the capture of that fortress city by the Russians in March, 1915, have been repeatedly told by soldiers of both armies as well as by residents of the city. So detailed and uniform are the accounts coming from widely different sources that, judged on the basis of evidence alone, the stories must be accepted as substantially true. In Przemysl and the surrounding country there are thousands of persons, many of them claiming to be eyewitnesses, who are positive that visions of the Virgin Mary and the Christ Child repeatedly appeared in the sky above the beleaguered city, and who are convinced that these visions were of supernatural origin.

That such visions did appear can scarcely be doubted, and since it is possible for modern science to have produced them, it is unnecessary to seek for any but natural causes. There is good reason for believing that the solution of the entire mystery is to be found in the workshops of the aeroplane and stereopticon makers—that the officers in charge of the defense simply took advantage of the latest developments in flying craft and projection apparatus to spread the conviction through the ranks of both armies that the city was under divine protection. The explanation given in the following paragraphs is designed to show how the Przemysl visions could have been produced easily by equipment that is now in everyday use.

According to reports the visions invariably appeared at night. It is a safe presumption that they appeared only when the sky was overcast with low-lying clouds, and that these were made to serve as a screen for the images projected by a stereopticon. Rain clouds are usually at a height of about half a mile above the earth. To project images so great a distance as this would be impractical. Too powerful a light would be required, and other difficulties would be introduced that might be impossible to overcome. The thing could easily be done, however, with the aid of an aeroplane, carrying an ordinary stereopticon, and flying from 700 to 1,000 ft. below the clouds.

Clear motion pictures have already been projected a distance of approximately 400 ft. By equipping a stereopticon with a searchlight instead of the usual arc light it would be entirely practical to project still pictures a distance of 1,000 ft. This would be sufficient for producing visions of an awe-inspiring nature, and with the exception of a special mirror for the searchlight, which could probably be found without any necessity for special manufacture, all the apparatus required would be such as can be obtained at any time on the market.

Essentially, a stereopticon consists of a projecting lens and a condensing lens, the latter serving to gather the scattered rays as they come from the light and turn them as a slightly converging bundle of rays into the projecting lens. The parabolic mirrors used in searchlights are made to reflect the light as a parallel bundle of rays having the same diameter as the mirror. For use with a stereopticon a special mirror would be required—one that would focus the rays into the condensing lens. To save weight, which is a vital consideration, the generator for supplying current to the searchlight could be driven by the aeroplane motor. Arranged in this way, the entire apparatus might run close to 1,000 lb. in weight, and it would probably be necessary to use a biplane, in preference to a monoplane, on account of its greater carrying power. Since there would be nothing to do in handling the apparatus but to turn the current on



"The Vision in the Sky" Which Influenced Two Armies at Przemysl in March, 1915: The Insert Shows How the "Vision" was—Probably—Projected upon the Clouds from an Aeroplane

and off, all need for a special operator could be overcome by placing the switch in convenient reach of the aeroplane pilot. Used with a biplane, the stereopticon could be carried at the side of the pilot in the position usually taken by a passenger, and to make it possible to cast the image on the clouds with the aeroplane in level flight, the stereopticon could be mounted with the line of projection pointing upward at an angle of 45° or 50° from the horizontal axis of the aeroplane.

Using the standard stereopticon slide, 2⅞ in. square, with a projecting lens having an equivalent focal distance of 16 in.—which would make a convenient apparatus for the purpose—the image cast at a distance of 100 ft. is 18 ft. 6 in. in diameter. At a distance of 1,000 ft. the image would have ten times this diameter, or 185 ft. Spreading the image over as big an area as this would result in an enormous loss in brilliancy if the ordinary arc light were used. With a searchlight this loss could be more than overcome. To produce an image of this size the airman would fly in a level line about 700 ft. below the clouds. Viewed from the ground half a mile below, the image would have the same effect as a highly luminous object 30 ft. in diameter, seen at a distance of a city block. The appearance of such an object in the sky above a city, darkened because of siege, would be a striking spectacle indeed. Soaring above the city with this simple equipment, the airman, by merely throwing an electric switch, would be able to spread hope or panic as far as his picture could be seen.

Several persons who saw the visions have said that they were "like the holy picture in the church at Czenstochowa." If the details of the undertaking are ever told, it will not be surprising if it is found that a photographic reproduction of this famous Madonna was used, for the reason that no picture in the world could have been used to better effect. The monastery of Czenstochowa is located about a hundred miles west of Przemysl and was in possession of the Austrians at the time of the siege. The painting is familiar to the inhabitants of all that part of Europe and is so venerated that it is visited annually by an average of 400,000 pilgrims, many of whom come from East Prussia, Galicia, and west Russia, as well as from Poland. According to tradition it was painted by St. Luke and there is a belief current that it is sometimes miraculously illumined. A reproduction of this picture cast on the clouds, "surrounded by a halo of bright light," as reported—which would mean that the stereopticon slide had been made with a liberal margin of clear glass around the edges—would be readily accepted as a divine message by these people of simple and strong religious belief.

Whatever may have been the precise means used for projecting the images, there can be no doubt that they produced the effect intended. Whenever the Virgin Mary was seen hovering over the city, the Austrians, believing they were under divine protection, took fresh hope, while the Russians became panic-stricken. For hours after each appearance of the vision it was impossible to persuade or force the Russian soldiers to fire, and it is reported that because of this the capture of the city was delayed for weeks. In one typical case a Russian commander, suspecting a trick by Austrian airmen, ordered a battery to fire at the vision, hoping in this way to bring down the aeroplane that was causing such demoralization among his troops. Instead of obeying, every man in the battery fell to his knees and prayed.

TWO NAVY MEN WIN PRAISE FOR GALLANTRY

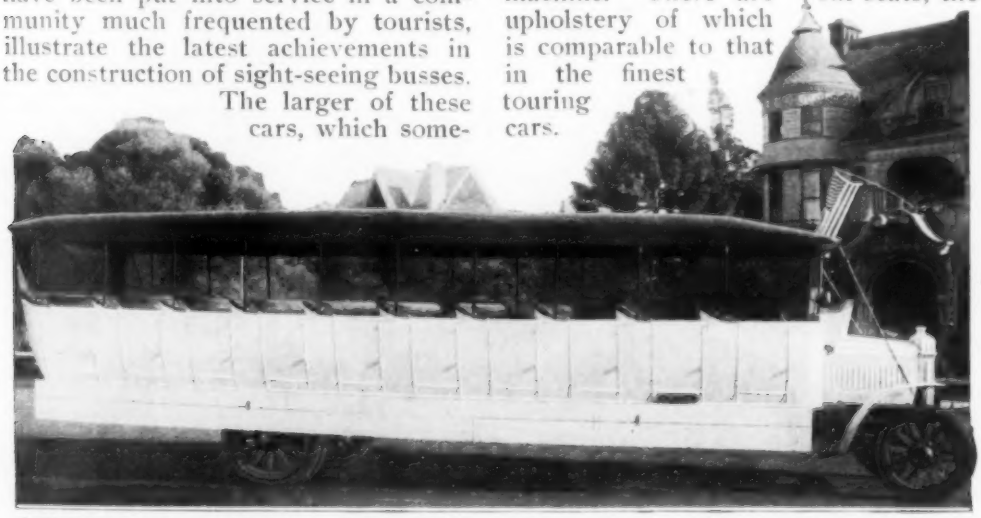
Two men in the navy, one a seaman of the second class, and one a chief boatswain's mate, have been commended by the Secretary of the Navy for acts of gallantry. The seaman jumped overboard into the tidal basin at Washington, D. C., and rescued a small boy from drowning. He brought the lad to the surface and applied first aid in a way

This Car with Six Cross Seats Conforms More Nearly to the Ordinary Touring-Car Design. The "One-Man Top" is Not Misnamed, for One Person can Open and Fold It

that showed he had a thorough knowledge of this treatment. In the other case mentioned, the boatswain's mate rescued a coxswain from drowning after a collision between a seaplane and a flying boat. Notwithstanding the fact that the rescuer's leg was broken in the collision, he dived three times in an effort to rescue his shipmate, who was unable to swim. This heroic action enabled the endangered man to grasp a portion of the seaplane and so keep above water until rescued.

HUGE SIGHT-SEEING CARS LOOK LIKE DACHSHUNDS

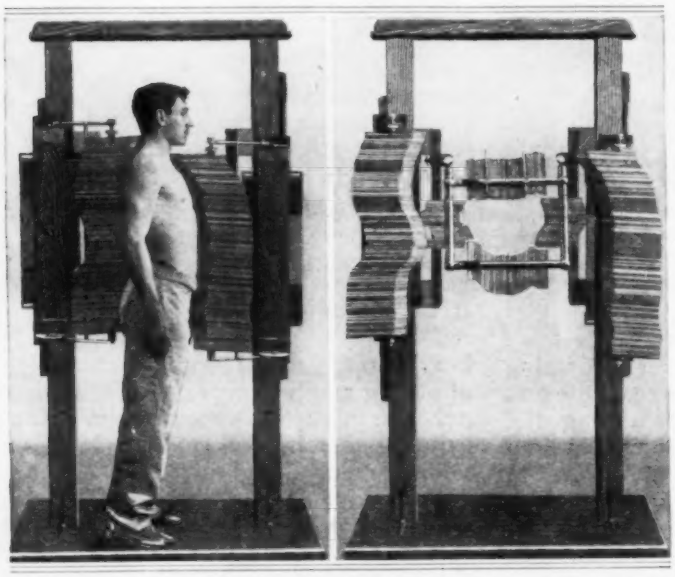
Two mammoth cars, which recently have been put into service in a community much frequented by tourists, illustrate the latest achievements in the construction of sight-seeing busses. The larger of these cars, which somehow suggest huge dachshunds, is 30 ft. 10 in. long, 8½ ft. wide, and has a wheelbase of 20 ft. 7 in. It has 10 heavily upholstered seats set crosswise, affording ample accommodations for 60 persons. Access to the seats is gained through side doors, beneath which is a folding step extending the full length of the body. This car has a maximum speed of 17 miles per hour. The design of the second machine adheres more closely to that of an ordinary touring car, having a streamline body whose shape is accentuated by a top of the regular one-man type. The car is equipped with a six-cylinder motor and an electric starter, and is capable of greater speed than the larger machine. There are six seats, the upholstery of which is comparable to that in the finest touring cars.



A Sight-Seeing Automobile That will Seat 60 Persons: The Frame and Upholstery of This Car Are Such That It Rides Very Easily in Spite of Its Great Length and Weight

DEVICE RECORDS OUTLINES OF HUMAN BODY

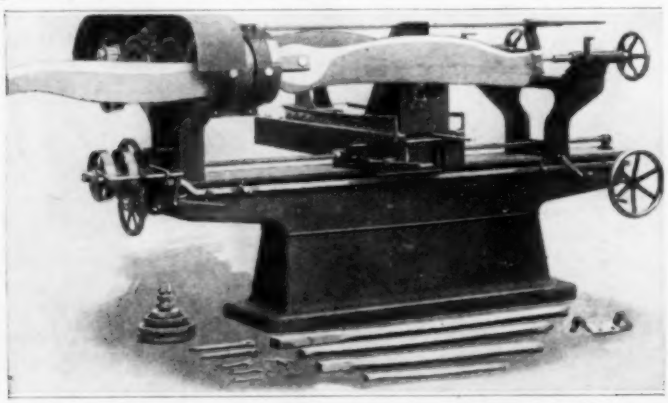
In France an interesting apparatus is used for obtaining graphic outlines of the torso when the physical fitness of a man in military or civil pursuits is to be determined. By analogous methods both vertical and horizontal cross sections of the trunk are procured quickly and with little effort. Thin, square boards provided with central slots are arranged on two vertical rods mounted opposite each other on pivoted brackets attached to a pair of upright posts that form part of a heavy frame. When the brackets are swung so that the stacks of boards are held in close proximity to a man standing on a platform between them, the units are adjusted to conform to the outline of the subject's figure. For obtaining horizontal cross sections, similar members are provided on the four sides of a rectangular frame.



This Shows How a Vertical Cross Section of the Torso is Obtained with the Aid of the Apparatus. When the Loosely Mounted Boards are Adjusted to Conform to the Outline of a Figure, They are Locked. Right: In the Middle of the Frame is Shown the Rectangular Device That is Employed When Horizontal Outlines of the Chest are Made

AEROPLANE-PROPELLER TURNING LATHE

A type of lathe has recently been installed in certain air-craft factories in this country which is designed expressly for turning out propellers and struts used on various types of aeroplanes. It will produce exact facsimiles of the models used, making both right and left-hand pieces from the same model, and by a simple adjustment either end of the work, or the entire piece, can be made larger or smaller than the model. The cutter head is fitted with six right and six left-hand knives and will successfully turn either soft or hard wood. A hollow chuck through which the wood is inserted is used in turning propellers, as each blade is turned separately.



Lathe for Turning Aeroplane Propellers: It will Copy Any Model, Producing Both Right and Left-Hand Pieces, Either Larger or Smaller Than the Original

The Good Ship "Casco," Once in the Service of Robert Louis Stevenson, as It Appeared a Short Time Ago When Used as a Training Ship by the Sea Scouts: Because of the Great Lack of Bottoms, Due to the War, the Yacht is being Refitted for Coastwise Trade

WAR BRINGS STEVENSON'S BOAT "CASCO" TO LIGHT

Many of Robert Louis Stevenson's present-day admirers will be interested in knowing that the little yacht, "Casco," in which the author sailed to the South Seas from San Francisco in quest of health, nearly 30 years ago, is being rejuvenated for coastwise trading in the Pacific. The craft, which was originally built for racing in California waters, has had an eventful career. It is a topsail schooner, 95 ft. long and of 70 tons' burden. It has graceful lines, behaves well under sail, and still has life, although time and hard usage have made it a very different boat from what it was when Stevenson chartered it for his voyage to Samoa. At that time it glittered with brass and boasted a salon that was fitted luxuriously. Those who are familiar with the "Wrecker" will remember the skipper of the "Casco," Captain Otis. The crew of "sea-lawyers," as Stevenson called them, was composed of "three Swedes and the inevitable Finn," when the author slipped out through the Golden Gate never to return. Stevenson subsequently went to Honolulu and, for a short time, engaged a house at Waikiki, where he wrote part of "The Master of Ballantrae." He then dispatched the "Casco" back to its owner at San Francisco. At a later date the boat was purchased by sealers and for a number of years engaged in that trade. At another time, according to rumor, it was used in smuggling Chinamen and opium into the United States. About a decade ago it was laid up at Victoria, B. C., and three years later was pressed into service long enough to transport a cargo of junk to Vancouver. It was then obtained as a training ship for a local

band of Sea Scouts, a juvenile nautical organization. Recently it again changed owners and is now being refitted.

SERVICEABLE FOUNTAIN FOR MAN AND BEAST

In the city of Louisville, Ky., are several bubbling fountains of a design

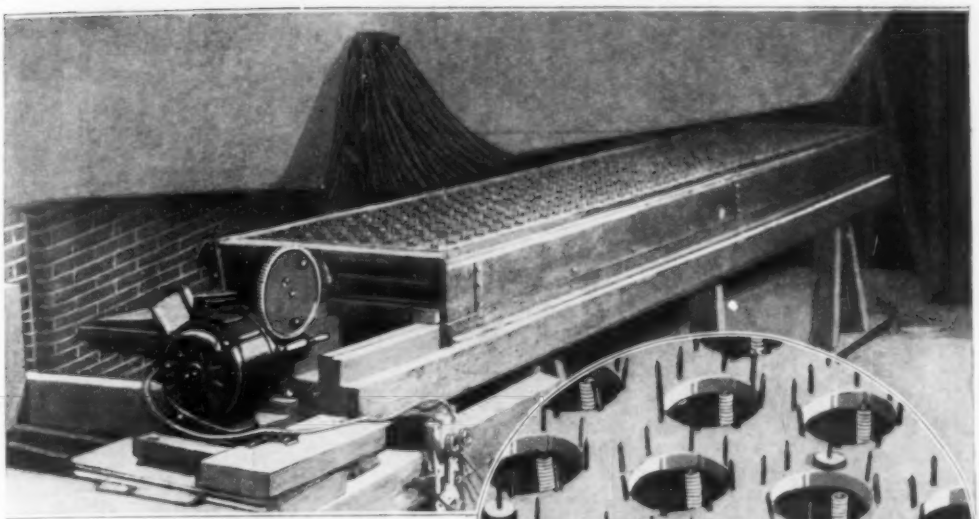
Sanitary Fountain in Louisville, Kentucky, with Bowl High Enough for Checked Horses to Drink From: The Water Overflows into the Street

which makes them especially serviceable for man and beast. The fountain's standard consists merely of a vertical piece of channel iron which occupies but a small space in the sidewalk and serves as a protection for the pipe through which the water flows. The bowl stands 48 in. above the curb, well out of the way of wagon tongues, and high enough to permit checked horses to drink from it. Water bubbles continuously from a vertical pipe projecting above the bowl, thereby affording a place where human beings also may drink. No overflow pipe is provided, the water falling into the street. This tends to keep the rim clean and lessens the chance of spreading disease among animals drinking at the fountain. A faucet is provided near the base for filling pails and the like.

"TALKING" ELECTRIC SIGN OF SIMPLE CONSTRUCTION

There is a noticeable absence of complicated wiring and expensive mechanism in a "talking" electric sign of considerable flexibility that has lately been introduced. Outstanding among its features, therefore, is its comparatively low cost of installation and maintenance. Particular advantages are that the style of type can be changed at will, without expense, and that the characters of any language can be reproduced without making changes in the wiring or mechanism. Designs of various patterns, and even animated cartoons, can likewise be executed with equal facility. As frequent changes of copy as desired are possible, and an office boy is as competent to make them as anyone. When the sign is in use, it does not require the attention of an operator.

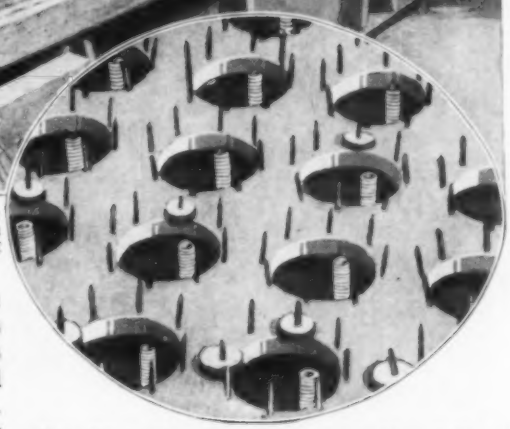
The signboard consists merely of a bank of incandescent lamps arranged in parallel rows and connected in series with a flashing apparatus that embodies the major part of the invention. The latter has the appearance of a large table. Cut in its top surface are circular holes which in number and position correspond to the lamps on the display board. Encircling each of the apertures is a series of upright pins whose bases are connected electrically. These members serve as supports for small, round contacts that are used for "lettering in" the sign. In the center of each metal disk is a perforation which permits it to be slipped onto any one of the pins. When so placed, a part of the member extends over the margin of one of the holes in such a way as to be encountered by a vertical coil-spring contact which is mounted on a movable board beneath the table and projects through the opening. It will be understood that one of these upright springs protrudes through each of the holes. The board is supported on ball casters that rest on a base plate. Power supplied by a motor is used to give the board a circular movement. The rotation is made step by step as the upright spring contacts are carried around the inner



The Flasher as It Appears When Regularly Installed: At the Near End will be Seen the Motor Which Rotates the Board on Which the Upright Spring Contacts are Mounted

circumference of the holes through which they protrude. In making this circuit they encounter the disks. This briefly explains the construction and operation of the switching mechanism.

In lettering the sign, the display board requires no attention. The words to be illuminated are spelled out on the switch table with the disk contacts. Each lamp on the sign can be used as many times as there are pins surrounding one of the holes on the flasher. By another arrangement that has been worked out, a practically unlimited number of pins can be employed. This is only needed, however, when a large number of words is to be shown. In actual use the sign displays its copy one word at a time unless two short words happen to come together. The intervals between the words is exceedingly brief so that one reads in a normal way without continual interruption.



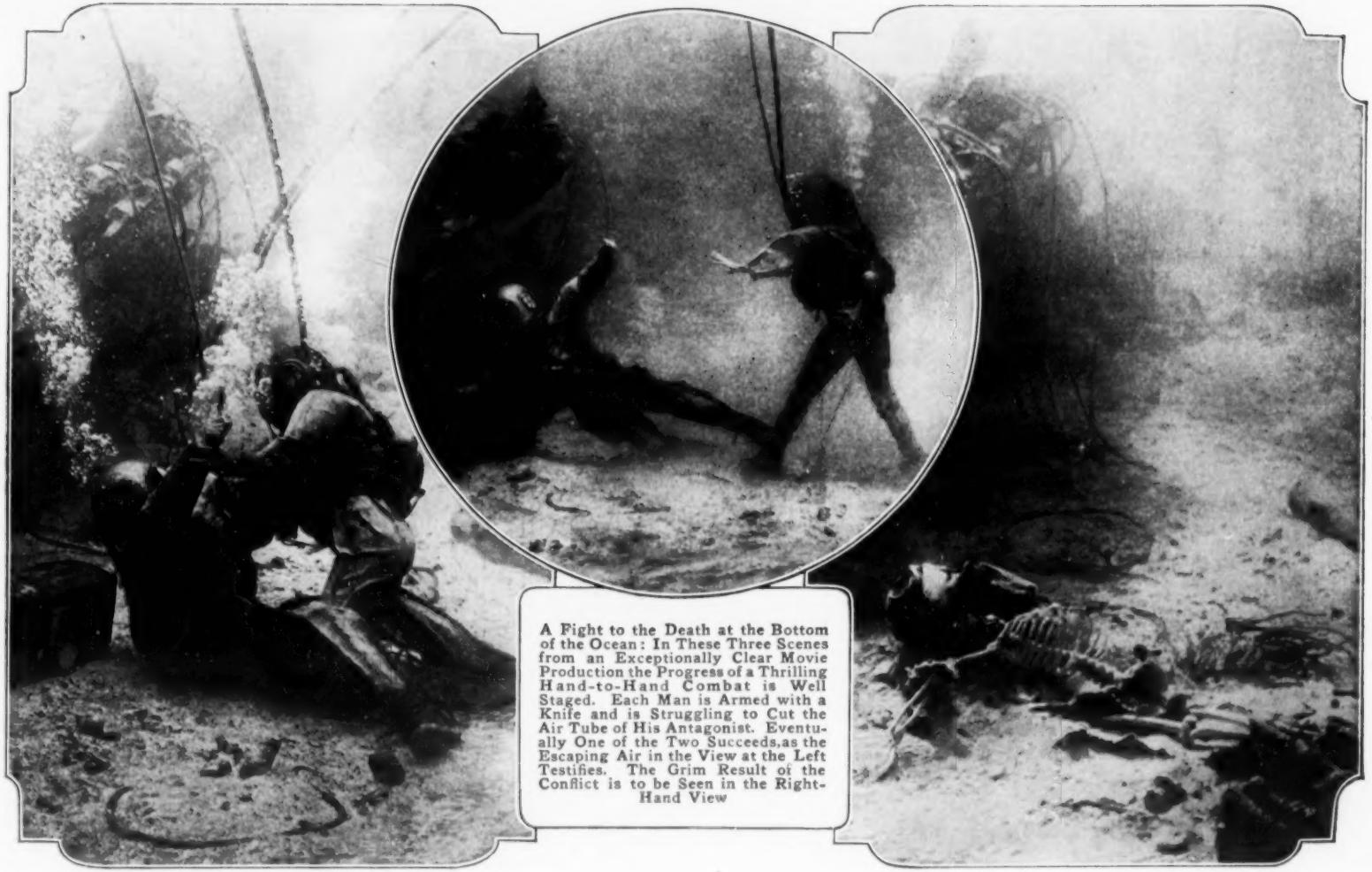
Close View of Top Surface of the Switchboard, Showing Some of the Disks in Place on the Upright Pins Encircling the Holes, Inside of Which the Coil-Spring Contacts will be Observed

LUNCH COUNTER'S PATRONS SIT IN THE STREET

A narrow V-shaped room at the end of a building erected in the acute angle of a street intersection in a Pacific coast city has been transformed into a quick-lunch establishment so arranged that customers can sit at its counters without entering the building. The sides are formed by counters set on the building line, while above the

Lunch Room in V-Shaped Area with Counters So Arranged That the Patrons' Stools Project over the Sidewalk

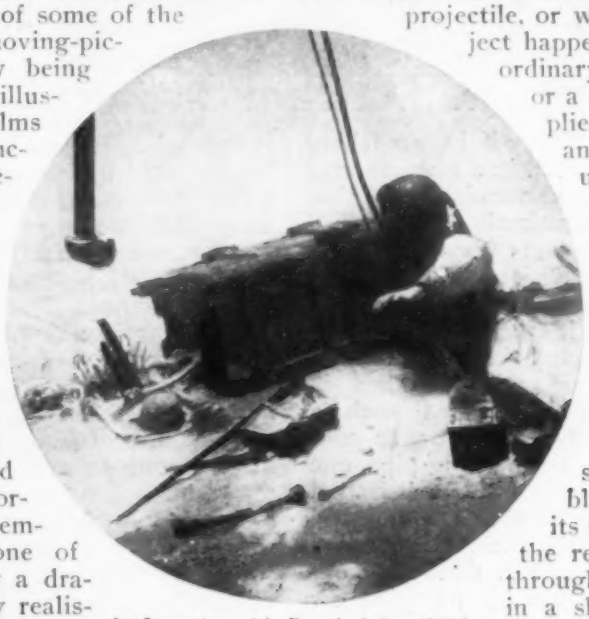
counters are removable windows. Hinged stools for the patrons are fastened just outside the room and extend over the sidewalk. These can be tilted up against the side of the counter.



A Fight to the Death at the Bottom of the Ocean: In These Three Scenes from an Exceptionally Clear Movie Production the Progress of a Thrilling Hand-to-Hand Combat is Well Staged. Each Man is Armed with a Knife and is Struggling to Cut the Air Tube of His Antagonist. Eventually One of the Two Succeeds, as the Escaping Air in the View at the Left Testifies. The Grim Result of the Conflict is to be Seen in the Right-Hand View

ROMANCE OF OCEAN BOTTOM PORTRAYED IN FILMS

To young and old alike, Davy Jones' locker has always held fascination. The magnificence of submarine scenery, the romance of sunken galleons and treasure chests have given the bottom of the sea an almost hypnotic charm to those of adventurous spirit. Therefore, there is little wonder that recent triumphs in underwater photography should create great popular interest among devotees of the movies. The excellence of some of the subaqueous moving-picture work now being done is well illustrated by the films of recent production shown herewith. The plots that supply the action are immaterial except in so far as they illustrate the freedom of movement that modern diving appliances afford submarine explorers. This is demonstrated in one of the pictures by a dramatic and fairly realistic battle that is staged by two divers, both armed with knives, who have discovered a treasure chest. One of them succeeds in cutting the hose that supplies the other one with air. In reel life the victim, of course, drowns, but in real life his welfare is not endangered, for he wears a suit supplied with oxygen independently of the surface pumps. The pictures have astonishing clearness and absorbing interest. In another submarine film an inverted periscope is clevérly employed. This device, which enables those on shipboard to watch and direct the diver, offers a suggestion of practical value.



An Invention with Practical Possibilities Suggested by a Movie Scene: According to the Scenario, an Inverted Periscope, Shown at the Left, Enables Persons on a Ship Above to Watch the Diver and Direct His Work

X-RAY PICTURES ARE SHOWN IN RELIEF ON SCREEN

By a comparatively simple arrangement, a French scientist has provided a means of obtaining stereoscopic X-ray images that enable a surgeon to see a bullet in its true position when it is lodged in a human body. When seeing an image in relief on a screen and being able to recognize its position in relation to bones, it is possible for a surgeon to estimate accurately the distance between his instruments and the projectile, or whatever the object happens to be. Two ordinary X-ray bulbs, or a single bulb supplied with a double anticathode, are used. They are energized alternately by a commutator connected in the secondary circuit, and project two images in quick succession on the screen. The double picture makes its impression upon the retina by passing through the openings in a shutter that consists of two perforated disks revolving in opposite directions. The shutter is so arranged as to shield and reveal the screen in unison with the opening and closing of the circuit energizing the anticathodes. The work is still in an experimental stage.

INFECTED AREA IN HAWAII SEARED WITH ODD TORCH

Destructive measures, almost warlike in their intensity, were taken not long ago in Hawaii to wipe out anthrax germs which threatened to devastate a large Honolulu dairy herd. Home-

Homemade Outfit in Which Distillate for the Torch was Kept under High Pressure

Supplying Oil by Cableway to Workmen Who Poured It on the Carcasses to be Burned

View Showing a Torch, Pressure Tank, and Some of the Rocky Ground being Scorched

made torches which burned distillate were employed in scorching every foot of ground in a six-acre area that had become contaminated. Also, the bodies of the animals that had died from the disease were burned and the cactus plants which covered a considerable portion of the ground were cut down, dried in a kiln, and consumed.

Each outfit included a tank, similar to the hot-water tanks installed in kitchens, which was fitted with a gauge, intake pipe, etc. It was connected by a hose with a long pipe, one end of which was fashioned into a burner by being bent into a coil and inclosed in a steel shell. The tanks were partly filled with distillate kept under high pressure by pumping air into the containers. To start the torch it had to be preheated, but once lighted it generated its own gas and produced a flame two or three feet long, covering a square foot of ground. The estimated temperature of the torch flame was 1,000° F. and its roar could be heard a long distance. Though much of the infected area was covered with volcanic rocks, and therefore difficult to burn over, there was no spot not bearing the bluish-brown stain caused by the fearful scorching. The plague had killed about 40 out of a herd of 150 cattle, but when the authorities undertook the measures here described, the spread of the disease was completely checked. One laborer contracted the disease but recovered in 10 days.

Cheesecloth Canopies Erected over the Conduits Reduced the Temperature and Prevented Recurrence of the Short-Circuiting

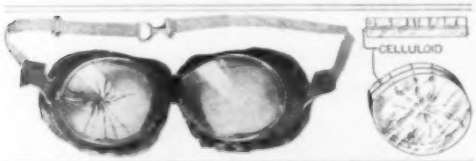
PREVENT SHORT-CIRCUITING OF CABLES IN ODD WAY

During a period of hot weather in New York last summer when the temperature averaged more than 90° F. at midday, some 11,000-volt, three-phase cables carried on a New York Central viaduct became short-circuited and temporarily crippled the division, which is in the electrified area. It was discovered that the temperature inside of the conduits approximated 140° and that the trouble was primarily due to that cause. In order to reduce the heat and thereby prevent recurrence of the short-circuiting, long canopies of white

cheesecloth were erected over the conduits carrying the cables. The cloth prevented the pipes from absorbing the heat of the sun and caused a temperature reduction of from 10° to 12° in them. That sufficed to meet the problem.

GOGGLES WITH THREE-PLY LENSES FOR AIRMEN

Our government has recently placed orders for a number of airmen's goggles and gas masks in which a special three-ply glass will be used because it affords greater protection to the eyes than ordinary glass. Its two outer layers are welded under pressure and heat to a central sheet of special material like celluloid. If the glass should be cracked, the fragments will cling to the middle ply instead of flying off. The center layer also insulates the two outer layers from each other with the result that each surface of the lens

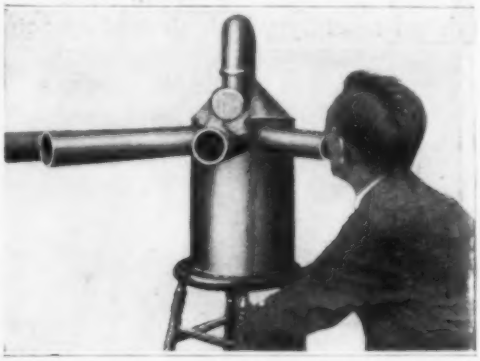


Airman's Goggles with Three-Ply Lenses Which, When Cracked, do Not Endanger the Eyes with Flying Fragments: The Diagram Shows the Make-Up of the Lenses

more readily acquires the temperature of the air next to it. Hence the glass is less apt to become clouded with mist.

VOICE ANALYSIS IS MADE WITH NEW APPARATUS

An interesting apparatus has been lately developed by a professor of musical theory to analyze the tone qualities of the human voice and determine defects that require remedying. The instrument is built of metal and consists in part of a vertical cylinder that has a continuous series of 16 horizontal tubes of various diameters and lengths radiating from around its upper section. The top of the device is cone-shaped and fitted with a curved pipe that is covered at the outer end by a membrane. A small pendulum mounted in conjunction with this is actuated by the vibrations produced by



When a Pupil Sings the Vowel Sounds with His Mouth Close to One of the Tubes, the Instructor Determines the Quality of a Certain Overtone by Watching the Action of the Pendulum

sound waves. In using the device, a vocal student sings the vowel sounds with his voice pitched at middle C and his mouth close to one of the hollow tubes, each of which is tuned to a different overtone of middle C. The presence or absence of a specific overtone is indicated by the movements of the pendulum. In this way the overtones that require development and those that should be modified are ascertained.

TILTED FLOWER VASES HELD IN WIRE FRAMES

For displaying flowers to their best advantage at horticultural exhibits, a wire rack has been devised which holds metal vases in an inclined position. In these receptacles the flowers are tipped forward toward the aisles so that they may be examined more readily by spectators. One of the big advantages offered is that when set at an angle the whole of a bouquet is brought into view.

HOW ARROW-SHOOTING ACT WAS FILMED

A motion-picture scene was produced recently which showed an actor

Acting a Movie Scene Backward: The Man on the Ladder is Pulling Out the Arrows by Jerking Invisible Threads. The Film of This Scene is Run Backward When Projected

standing against a tree while arrows were shot at him, some grazing his flesh. The hair-raising episode was produced without risk by acting it backward, so to speak. The arrows were carefully stuck in place about the actor and then, while the camera man turned his crank, an unseen assistant jerked them out one at a time, while the actor "registered" pain at the proper times. The film was then run through the projector backward and the effect produced was most startling.

ESTIMATING THE COST OF FEEDING DOGS

A dog hater in New Hampshire, stimulated by the campaign for food conservation, sharpened his pencil, and this is what he figured:

One person in 20 keeps a dog: that's 5,000,000 dogs. It costs 10 cents a day to feed a dog, or $36.50 a year for one, and $182,500,000 per annum for all of them. With flour at $15 a barrel, this sum would buy 12,166,000 bbl. of flour. If loaded 12 bbl. to each motor truck, 1,000,000 trucks would be required to load the flour at one time, and they would make a procession 2,272 miles in length.

The figures seem to be all right and unquestionably impressive, but who can estimate the heart pangs and personal loss to 5,000,000 small boys, if deprived of their dearest treasure?

MONUMENT MARKS STATE'S FIRST RURAL MAIL ROUTE

Within the last few weeks an interesting monument has been erected at the intersection of two thoroughfares in Climax, Mich. It commemorates the establishment, 21 years ago, of rural free delivery of mail in that state. The unveiling was conducted in the presence of the two carriers who were the first to take the letters to Michigan farmers. The memorial marks the place where the men left the town post office to cover their routes, which they are still traveling. Climax was one of the first

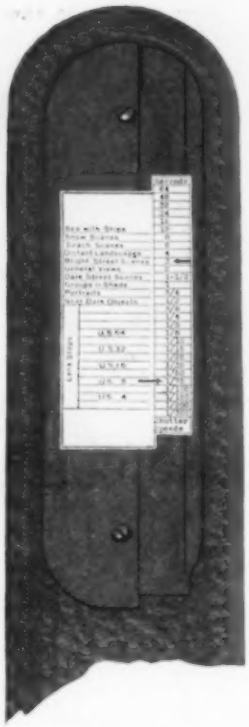
Monument Lately Erected at Climax, Michigan, to Commemorate the State's First Rural Free Delivery Mail Service, Which Was Among the First Established in America

In the Upper Left-Hand Corner Are Two Views of a Camera Case Showing the Exposure Slit Open and Closed. At the Left Below Is a Spool with Tested Paper on Its End. The Insert Shows a Camera Ready to be Loaded with a Spool Having a Cap on One End

post offices in the country to inaugurate R. F. D. service. The plan was put in force there on Dec. 3, 1896. According to the report of the Post Office Department for 1897, rural delivery was inaugurated for the first time on Oct. 1, 1896, out of Charlestown, W. Va. The monument contains 240 field stones gathered from each of the 240 farms on the rural mail routes radiating from Climax. It is surmounted by a cluster of electric lamps and a flagpole.

CAMERA DEVICE DETERMINES PROPER SHUTTER SPEEDS

To assist one in determining the proper shutter speed to employ when making a photographic exposure, an attachment has been designed for folding cameras that use roll films. The device is universal in operation and obviates the necessity of making allowances for seasons, latitudes, and local atmospheric conditions. It eliminates guesswork and helps a photographer or amateur to obtain satisfactory negatives without trouble. A circular piece of specially prepared bromide paper that prints green is attached to one end of a film spool. A revolving disk with a small round aperture is fitted in the camera case. If this is turned until a slit beneath it is uncovered, a tiny section of the test paper is exposed to light. At the same time a permanent color band is disclosed for comparison. The number of seconds required for the sensitized paper to match the permanent color, serves as a key to an instantaneous gauge. Fixed on one side of the camera case is a graduated list of general subjects such as, "Sea with Ships," "Snow Scenes," and "Groups in Shade." Immediately beneath and similarly tabulated are the lens stops. A sliding member working next to the stationary scale carries the shutter speeds in terms of seconds ranging from $\frac{1}{300}$ to 64. A street scene, for instance, is to be photographed and stop "U. S. 8" used. The sliding scale is moved until three, the key number obtained by use of the test paper as previously explained, is even with "Bright Street Scenes" on the first list. By then glancing opposite "U. S. 8," the shutter speed, $\frac{1}{75}$, the proper timing for the particular exposure, is indicated. The operation consumes only a few seconds.

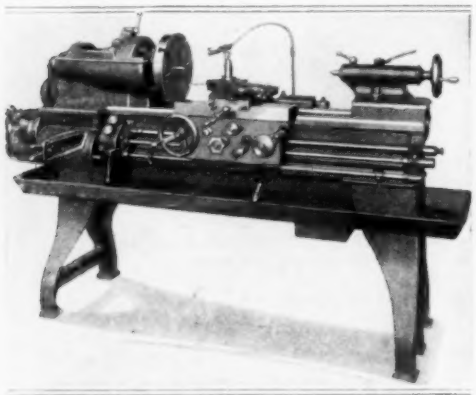


Slide Rule on the Side of the Camera Which Aids in Determining the Right Length for an Exposure

GOOD FEATURES COMBINED IN TOOL-ROOM LATHE

A number of features have been combined in a tool-room lathe now on the market which give it accuracy, simplicity, and power. The headstock is of rigid construction, being a heavy one-piece casting; the gear guards form an integral part of the head and furnish a protective covering for the

cone, while in the top of the guard is a brake for stopping the rotation of the spindle. The back gears are placed un-



Tool-Room Lathe in Which Several Special Features have been Combined to Produce a Machine That Is Simple, Accurate, and Convenient to Operate

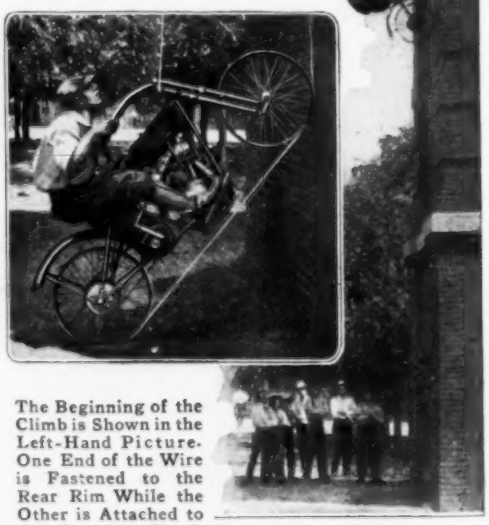
der the headstock, at the front end of the spindle, and are brought into mesh by a handle placed at the front of the machine, thus making it unnecessary for the operator to reach over the cone. For screw cutting, the lathe provides a range of threads from 1½ to 80 per inch. The motor is so geared to the spindle that four mechanical changes of speed are obtainable. To provide perfect alinement, a foot has been placed in the center of the right-hand supporting framework, thus carrying the machine on a three-point support and keeping it free from strains when it is bolted down.

CANADA PUTS RESTRICTION ON CANNED VEGETABLES

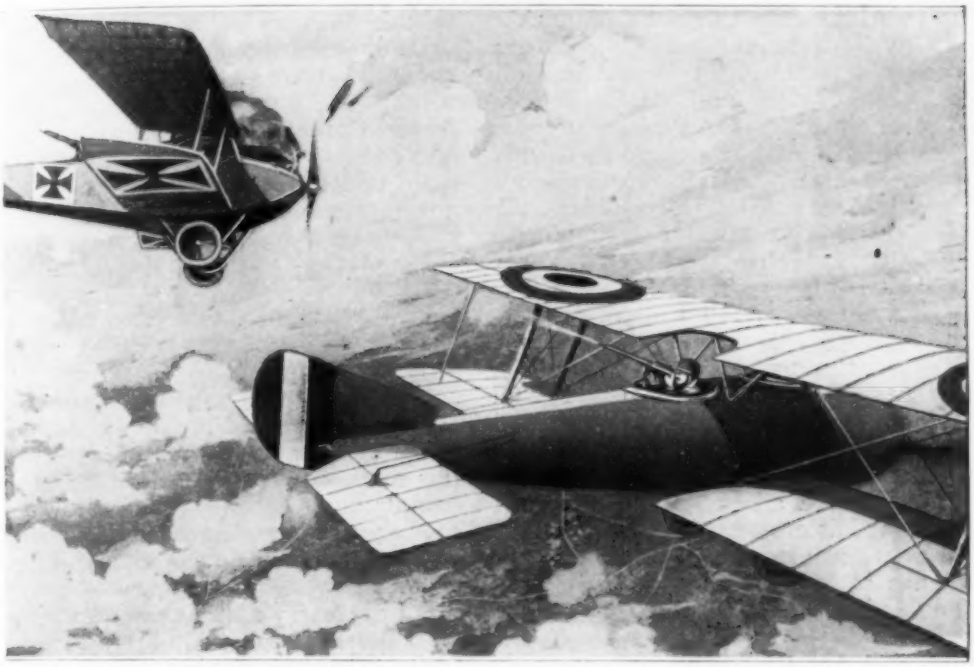
Canned vegetables have been placed under a ban in Canada. The food controller believes that there are sufficient fresh vegetables available to more than meet present needs and that by consuming canned garden produce at this time the Dominion's winter supply will be endangered. For this reason he forbids the use of canned vegetables this fall. Just how long the ruling will remain in effect is not stated. It is thought that the new rule will benefit the market for newly grown vegetables and prevent quantities going to waste.

MOTORCYCLE SCALES WALL BY CLIMBING WIRE

To entertain a small group of spectators, an Oklahoma motorcyclist recently made his machine scale the side of a brick building at Alva. The feat was interesting more because of its spectacularity than anything else. One end of a strong wire was attached to the cycle's steering head and passed over a wheel suspended from a bracket projecting from a fourth-story window. The tires were removed from the machine and the other end of the wire was wrapped once around the rim of the front wheel, stretched through the valve hole in the rear one, and fastened to the spokes. The handlebars were wired to prevent movement, and a guide wire was provided so that a man on the ground could keep the motorcycle straight. Also the carburetor was turned so that it would function while the machine was in a perpendicular position. With the engine running, the rear wheel served as a reel pulling the cycle and rider up the side of the building nearly to the fourth story.



The Beginning of the Climb is Shown in the Left-Hand Picture. One End of the Wire is Fastened to the Rear Rim While the Other is Attached to the Steering Head. The Ascent up the Wall was Accomplished by Making the Rear Wheel Serve as a Reel for the Wire



COURTESY OF THE AEROPLANE, LONDON

GERMAN'S ERROR GIVES BRITISH FLIER VICTORY

AN experienced airman would assert that this picture is not true to life because no trained flier would expose himself to return fire in the way the attacking German is depicted as doing. Nevertheless an actual, though very unusual, occurrence is here illustrated. During an attack by a German aeroplane on a less speedy British craft, made from behind and just below the tail of the slower machine—a position that gives the aggressor every advantage—the British gunner emptied his weapon in ineffectual fire and quickly reached for another drum of ammunition. In his haste he dropped it in the cockpit and instantly leaned down into the hole to get it. The German, not seeing him, supposed he had killed his man, and boldly rose above his enemy just at the instant the latter's head reappeared. In a flash the British gunner grasped this rare opportunity and poured such a stream of bullets into the aeroplane above him that it dived wildly and then crashed to earth.

OUTPOISONING THE POISONERS

By E. T. BRONSDON

DURING the German assault upon Armentières recently, a strange and ghastly phenomenon was witnessed. Many of the shells which fell in the town were seemingly of very fragile construction. They scarcely dented the ground where they burst. They injured very few people with flying particles. They did not contain either cyanogen gas or chlorine. There was a slight incenselike odor, but this was attributed to a peculiar and impotent powder the Huns were supposed to have been forced into using. There seemed to be no reason for the shells.

Six hours later the ghastly truth began to make itself known. Soldiers, male citizens, women, and children began to collapse by the score. Many fell in convulsions. Some went stark, raving mad. The whole community was poisoned—poisoned by some new and terrible agent that even the German archfiends had not dreamed of using before.

For nearly a week the terrible gas did its work, although the shell attacks ceased abruptly on the first day. Four thousand individuals died in agony greater than even the feared chlorine ever had caused.

The agent employed was arsine, known in the laboratory as arseniureted hydrogen, one of the deadliest of all fumes known to the chemist—beside which hydrogen cyanide and carbon monoxide may be trifled with in comparative safety.

This fume fury can be made quickly, easily, and in immense quantities, merely by treating any arsenical ore with hydrochloric acid. Made for demonstration purposes, where the pure gas is desired, the method is to mix arsenic with zinc shavings, and to pour over the receptacle hydrochloric acid. The chlorine combines with the zinc, a little water is released, and a large quantity of the arsine is formed.

The allies will feel a natural reluctance to use this weapon, just as they felt a natural reluctance to adopt the Germans' chlorine, sulphur dioxide, and "Flammenwerfer" attacks. These fall outside the pale of civilized warfare, in the same class with well-poisoning. No nation should adopt such tactics, but this war has crossed the boundaries of all civilized precept. The allies' only chance is to match the "Schrecklichkeit" of the Hun with still greater awfulness. If this can be accomplished with the Germans' own weapons, so much the better.

The arsine bomb is the most deadly weapon the world has developed. Thrown from an aeroplane, or projected from a high-caliber howitzer or rifle, the gas spreads slowly upon striking. The gas is invisible, and so heavy that no wind short of a hurricane can dispel it sufficiently to make it harmless. It is known as a "creeper"—that is, it follows the hollows of the ground, and progresses by inches. For this reason its presence is apt to be unsuspected, and it may take a week to complete its deadly work.

One whiff—and it does not have to be a lungful, by any means—is certain death. There is no remedy or antidote known to medical or chemical science. The effects are in some respects much the same as ordinary arsenic poisoning—the suffering which ensues upon accidental eating of rat poison is an example of this—but in addition, the gas attacks the big nerve centers in a totally different manner, causing aberration and convulsion, and death in a half hour or so, after the first symptoms are noticed.

The Germans made another vital mistake in revealing this terrible weapon, the arsine bomb, to the allies, for these nations most assuredly never would have thought of using it otherwise. The mistake lies in the fact that while the Germans foisted this ghastly reality upon modern warfare, they have not the arsenic to pursue the course they have elected. They can employ this agent very seldom, making a hideous threat now and then, but not carrying it into a campaign such as they have done with the Flammenwerfer, or liquid fire.

The allies, on the other hand, have supplies of arsenic ore which are unlimited, so far as the possible needs of this conflict are concerned. They could manufacture in one year more than enough arsine bombs to kill every man, woman, and child in the whole of Germany and Austria-Hungary. An airplane can carry a sufficient number of glass-bottle bombs, filled with arsine under pressure, to make uninhabitable a town of five hundred inhabitants. This all in one trip. This is said advisedly; the inhabitants cannot protect themselves by masks or other devices as when fighting other fume enemies such as chlorine and sulphur dioxide, for there is no known substance which will absorb arsine as lime absorbs chlorine.

With the "edge" which the coming air fleet of the United States will give to the allies, the arsine bombing of Essen-on-Ruhr, Potsdam, Zeebrügge, Wilhelmshaven, and other strongholds of Germany, should be an easy matter.

CONCRETE FLOOR PROVES ALMOST UNBREAKABLE

To the astonishment of many builders and engineers who witnessed the test, a portion of the sixth floor of a Chicago building of reinforced-concrete construction refused to give way recently under a load of over 1,000,000 lb. of pig iron. The test was undertaken in an effort to ascertain just what loads this type of construction could stand and it proved how remarkable is the supporting power of a thin

Left: Measuring the Stress on Steel Rods Imbedded in the Concrete. The Stress on Some of the Reinforcing Was 52,000 Pounds per Square Inch. Right: A View Showing Part of the 1,224,000 Pounds of Iron Piled on an Eight and One-Half Inch Concrete Floor in an Unsuccessful Effort to Break It

layer of reinforced concrete. The building, though less than 10 years old, is to be razed to make room for a larger one, and this fact gave an opportunity for the unusual demonstration.

The floor which bore the strain is 8½ in. thick and was built without girders, but strengthened by four-way reinforcing of round ⅝-in. rods of high-carbon steel. The pigs of iron were piled slowly on an area measuring 24 ft. 11 in. by 28 ft. 9 in. and supported beneath by nine pillars with caps 4½ ft. in diameter. The floor was designed for a load of 250 lb. per square foot and it was thought it would surely break under a weight of 800 lb. per square foot. But a total of 1,224,000 lb., or 910 lb. per square foot, failed to cause any serious signs of weakening, though the maximum sag was about one inch. From measurements of the stresses on the steel rods and the compression of the concrete it was estimated that 1,500 lb. per square foot would be required to break the floor.

¶One of the government's practical suggestions for war-time economy is that paraffin which has been used once be cleaned and saved instead of being thrown away. Sometimes the pieces can be cleaned with a brush and in other cases it is easier to strain them through cheesecloth after melting.

TO KNIT OVER A MILLION ARTICLES FOR TARS

Tens of thousands of American women are wanted to help win the war by patriotic use of their knitting needles. Ten knitted articles are needed for each tar in our navy to keep him efficient and alert despite the bitterly cold blasts of the sea. The Comforts Committee of the Navy League is now engaged in getting the women of the country to fill what amounts to one of the biggest knitting orders on record. There are approximately 140,000 men on our battleships, cruisers, destroyers, etc., each of whom the committee proposes to supply with two helmets, such as is shown here, two woolen jackets, two mufflers, two pairs of socks, and two pairs of wristlets, making a total of nearly 1,500,000 knitted articles. The work is to be done by volunteers who will pay for the material which they use. Those who desire to help should write to the Navy League Comforts Committee in their respective states.

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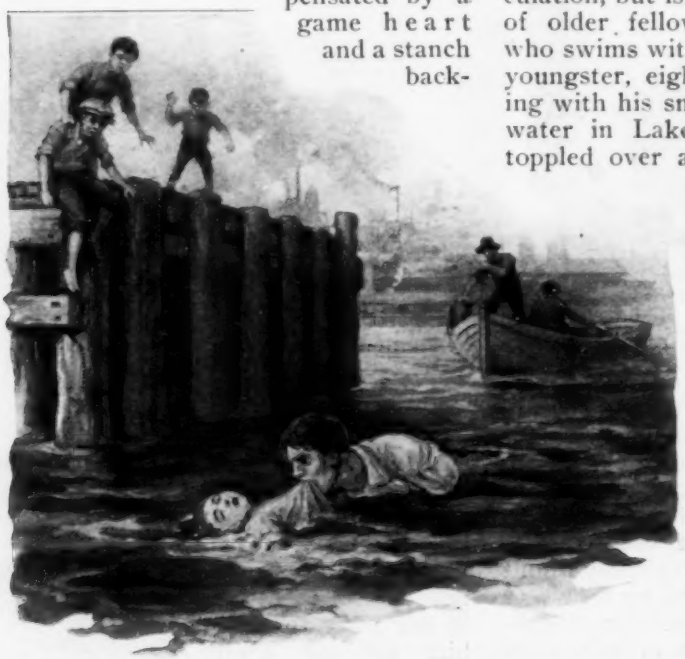
ARMLESS BOY PULLS CHILD FROM LAKE WITH TEETH

In Chicago there is a 17-year-old lad whose lack of arms is partly compensated by a game heart and a stanch backbone. He proved his mettle a few weeks ago in a way that contributed something to the tradition of the American boy. There is inspiration in the story, and it not only deserves circulation, but is worthy of the thoughts of older fellows than John Curran, who swims with his legs only. A little youngster, eight years old, was playing with his small brother on a breakwater in Lake Michigan. When he toppled over and fell into the water, the other boy ran screaming to a near-by group of playmates. It was the armless chap, however, who faced the test. He raced to the edge of the breakwater, leaped into the lake, and swam to the place where the child appeared for the third time. Using his teeth, he grabbed the boy and struggled shoreward. Efforts to revive the little fellow proved futile and he died before an ambulance reached him. But the pluck of John Curran should live.



A Heroic Chicago Boy, Though Armless, Leaped into the Lake and Rescued a Drowning Child by Seizing the Latter's Clothing with His Teeth and Then Struggling Shoreward. Efforts to Revive the Child Proved Futile

MOWING-MACHINE TRACTOR IS CONVERTED ROADSTER

Four cylinders, even though they be small ones, are better than two horses when it comes to providing propulsion power for the big mowers used on golf courses. This, at least, is the verdict of the superintendent of grounds at a mid-western country club where the fairways and greens are kept in spick-and-span condition. By supplying the rear axle with a pair of broad-rimmed steel wheels and making certain modifications in the cooling system to provide proper circulation of water when driving up and down steep inclines, the man has converted a light roadster into an efficient little tractor. It pulls a mowing machine at an even speed, and accomplishes the work quickly and at low cost.

For Keeping the Turf Short on a Mid-Western Golf Course, This Dressed-Up Roadster has Proved a Good Investment

LIGHTS LEND NEW BEAUTY TO RECREATION SPOTS

New and Striking Beauty has been Given to the Famous Statue of Lincoln, Shown Above, at the South Entrance of Lincoln Park, Chicago, by Flood-Lighting It with Powerful Lamps. The Illumination Is Particularly Effective Because behind the Figure Is a Contrasting Wall of Living Green

The Equestrian Statue of General Grant, Also in Lincoln Park, Chicago, has been Illuminated in an Equally Effective Manner by Concealing Lights about Its Base. Always Conspicuous on Account of Its Lofty Position beside a Popular Drive, It has Now Become Doubly so at Night

One of Two Steel Lighting Towers That have been Installed at One of Chicago's Bathing Beaches, Making This Recreation Center as Safe at Night as in the Daytime for the Thousands of Bathers Who Congregate There during Warm Weather: Each of the Towers is Equipped with Seven Parabolic Reflectors and 1,000-Watt Nitrogen Lamps Which Throw a Bright Light Far Out over the Water

COURTESY COMMONWEALTH EDISON CO.

LONDONERS WARNED OF AIR RAIDS BY POLICE SIGNS

Traffic noises in London during the daytime drown the sounds of bugles and sirens which are regularly employed at night to give warning of approaching aerial raids. Because of this, a new plan has been adopted. After a general signal, which consists of firing three bombs at intervals of 15 seconds, policemen equipped with sandwich placards bearing the legend, "Police Notice: Take Cover," hurry through the streets, some of them on bicycles, blowing their whistles loudly to attract the attention of pedestrians. In this way everyone is informed of the coming danger and given adequate chance to reach shelter before the swiftly flying raiders arrive overhead.

COURTESY L'ILLUSTRATION

Policemen Wearing Sandwich Placards Race in London's Streets Blowing Their Whistles Loudly to Warn Pedestrians of an Approaching Air Raid

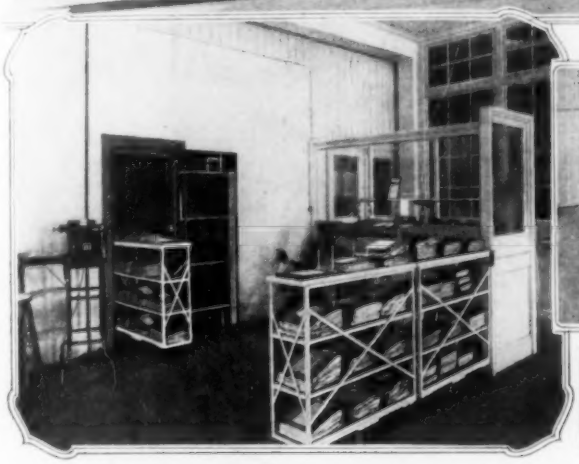
PUBLIC SERVICE RESERVE FOR PATRIOTS AT HOME

One of the important official channels through which the men of the country not in the fighting forces can aid in the war is the United States Public Service Reserve which has been established under the direction of the Department of Labor. Adult males of all trades and professions are asked to enlist in this body. The purpose of the reserve is to make available for the country's good the varied abilities of the nation's men. Every member of the reserve fills out a blank which is kept on file in Washington, in which he states his occupation, his training, his fitness for various peaceful pursuits, his ability and willingness to change his location, etc. All these data are carefully classified at the capital, for as the war progresses, it seems certain that there will be much demand for variously trained men to keep our economic forces at war strength. Every reserve member agrees to give unselfish consideration to any opportunity for patriotic service which this body may present to him. There is no compulsory feature in the organization.

MODEL FACTORY BUILDING IS LIGHT AND AIRY

To those who are intimately familiar with the sweatshops and fire traps in which thousands of city men and women are employed, a small manufacturing plant lately erected in one of the west-

The Exterior of the Factory Is as Inviting as Many Residence Structures. The Well-Kept Lawn, Bright Flower Boxes, and Gay Poppy Beds Contribute Much to Its Attractiveness



Attractively Furnished Rest Room for Girl Employes Where They Often Gather for the Noon Hour: Adjoining Is a Modern Kitchen Equipped with an Electric Range

Left: Reference Books are Held in Open Portable Racks That at Night are Locked in the Vault

ern states would doubtless be a complete revelation. The building is a one-story structure of tile and concrete and is generously provided on all sides with spacious windows that flood the interior with air and sunlight. Instead of dark, forbidding walls, the exterior is finished in white. At each window there is a flower box, and spaced at intervals are trellises that in time will support green vines. The factory is surrounded by open ground and faces a well-kept lawn. Glass partitions, white walls and ceilings make all parts of the interior equally light and attractive. There is no place for dirt or papers to accumulate in the business office, which is situated at the left of the front entrance. Open racks fitted with shelves and mounted on rubber-tired wheels hold the company books that are subject to daily reference. When placed end to end, they form a counter across one part of the room during office hours, and at night are pushed into a large vault. For women employes, a rest room equipped with a kitchenette is provided. It is furnished with plain, comfortable things and enables those who wish to do so to prepare warm drinks at luncheon time.

AUTOMOBILE TIRE PUMP WITH DOUBLE ACTION

A tire pump just being put on the market has a single cylinder, but is double-acting, air being forced into the tire on the upstroke as well as on the downward stroke, thus saving time and labor. Air is taken into the cylinder through a small hole in the piston rod, just under the handle, and the construction prevents any of the air escaping except into the tire. No leather is used for valves or packing.

Submarine Scenes Painted under Water: The One on the Left Shows a Stately Kelp Grove Rising from Glistening White Sea Sand. The Right-Hand Canvas Shows Coral-Eating Fish of the Chaetodon Species and was Painted off Tahiti in the South Pacific

PAINTINGS EXECUTED UNDER THE WAVES

By ROBERT H. MOULTON

A DISTINGUISHED American artist devotes his life to painting pictures under water. He holds that it is impossible to catch the colors and what may be called the atmosphere of submarine scenery by any method of observation from the surface. He goes down to the bottom of the ocean wearing water-tight goggles, similar to those worn by the famous pearl divers of the South Seas. These goggles are merely bits of cowhorn cut and shaped to fit the eyes. They allow a small space of air between the eyes and the water, so that one can see perfectly. He uses a weight to carry him to the bottom, where he makes sketches on a specially prepared waterproof paper with waterproof crayons. The paper is first rubbed with cocoanut oil and stretched on a piece of glass with surgeon's tape. After several descents, each for about a minute or so, he gets his pictures outlined and then completes them in his studio.

Mountains of Coral at the Bottom of the Sea: A Striking Painting Which Shows That the Beauties of the Deep Rival Those Found on Land

Under the water, the artist says, there are rivers, lakes, and waterfalls, just as there are above water. The gleaming sand, swept down by the action of tides, furnishes this illusion.

The finest work of this man has been done at Tahiti, one of the Society Islands, but he has secured excellent subjects off Santa Barbara. The coloring beneath the ocean, he avers, is all in the lowest keys, merging from deep indigo and purple into the lighter, more delicate tints of pale greens, grays, and yellows. Every point, every sharp edge, shimmers like silver in the upper regions. Rocks and cliffs in the dim light assume an appearance of inconceivable size. On land we see the foundations of every object, no matter how large or small its bulk, but when one looks down into the depths of the huge coral formations under water they seem to be resting upon deep, blue air.

Although he can work at any reasonable depth, the artist prefers about 30 feet.

The Painter of Submarine Pictures in the Costume He Wears When Making His Sketches under Water: His Water-Tight Goggles, Similar to Those Worn by South Sea Pearl Fishers, are Suspended from His Neck

OLD CUSTOMHOUSE REVEALS EARLY BUILDING METHODS

That a massive structure like the customhouse in New Orleans, erected on planks and logs in marshy soil, could stand for almost three-quarters of a century without a crack of any character and remain today as substantial as when it was built, has caused modern engineers to marvel. Attention was recently called to the well-preserved condition of this historic structure when certain repairs were being made. The building's foundations rest on a plank floor, 7 ft. below the sidewalk, on which is a grillage of 12-in. logs covered with a layer of concrete 1 ft. thick. The erection of the customhouse was begun in 1848 and since that time it has sunk a foot or two, with one end slightly lower than the other, and yet the building has not suffered from this settling. Another proof of the superior character of its construction is the well-preserved roof. Workmen have removed its copper covering, revealing a great layer of southern yellow-pine sheathing in almost perfect condition.

¶The new graving dock which is nearing completion at Point Levis, Quebec, is said to be the largest in the world, being 1,150 ft. long, 120 ft. wide, and 45 ft. deep.

GOING "OVER THE TOP" MADE EASIER FOR SOLDIERS

Features which might come under the classification "all modern improvements" are to be found in the front-line type of trenches that have been dug for soldiers in training on the campus of an American school. The features in question are notches in the trench wall and pegs, or handholds, projecting from the ridge of the parapet. These are of material assistance in giving a quick start to the charging Sammies.

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View of a Training Trench Dug in This Country by a Corps of Engineers and Provided with Features That Help the Occupants to Make a Quick Leap toward the Enemy

WORLD'S SUPPLY OF MEAT SERIOUSLY DEPLETED

In a few figures issued by the food administration in Washington is to be found one of the reasons for high meat prices. In comparing present with pre-war conditions a total decrease of over 115,000,000 in the number of the world's meat-producing animals is shown. While the increase of cattle in the United States was 7,090,000 during this period, the total world decrease was over 28,000,000. Sheep decreased 3,000,000 in the United States and 54,500,000 in the world. Hogs increased 6,275,000 in this country, but the world's supply decreased 32,000,000, approximately. For the year ended June 30, 1916, our meat exports totaled 1,339,193,000 lb., whereas the average for the three years before the war was 493,000,000 lb. These exports have gone chiefly to our allies whose stock of animals has decreased by 33,000,000 head.

TRUCK CONVERTS A ROCKER INTO A WHEEL CHAIR

In the household where there is a feeble or convalescent person, an improved rocking-chair truck such as is shown here may often be used to great advantage. It can be easily placed beneath a rocking chair, converting the latter into an excellent substitute for a wheel chair. The truck consists of two rubber-tired wheels connected by a drop frame of steel tubing which hangs down, close to the floor.

An Improved Rocking-Chair Truck and a View Showing How, by Means of the Truck, a Rocker can be Converted into a Substitute for a Wheel Chair

Landing a 15-Foot Shark on the Beach at Santa Monica, California: This Creature Is Especially Valuable Because of the Oil Obtainable from It

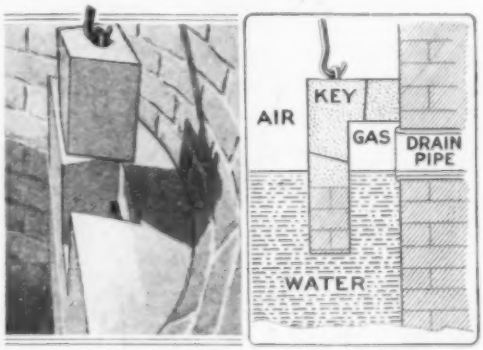
FISHERMEN FIND SHARKS PROFITABLE CATCH

Shark fishing has evolved from a sport to an organized industry in the Pacific waters off the southwestern coast. The skin of various species of the fish when tanned forms a tough, durable leather that is in considerable demand, and the oil that is extracted from the carcass likewise has commercial value. Of late a Japanese syndicate has undertaken the exploitation of this long-neglected field and, as a result, large numbers of sharks are being captured. The mottled skins of the tiger sharks are being made into slippers, belts, gloves, and other articles, while those of the great blue and basking sharks, which are especially thick and strong, are used for purposes that demand long-lived material.

A Shark Caught in a Halibut Net: Such a Catch is Now Welcomed by the Fishermen Who No Longer Consider It Valueless

IMPROVED TRAP WITH KEY FOR CATCH BASINS

By inventing a sewer trap with a removable key for catch basins, a contractor has provided an improved feature in sewer construction that enables workmen to clean a clogged outlet quickly without descending into the catch basin or tearing away any part of it. Extending inward from the side of the sewage reservoir just above the outlet is a wall, or shelf, whose inner edge rests on a vertical wall that extends downward a short distance below the water level and rests on a crossbar set in the curved basin wall. The



Catch Basin with Patented Trap, Showing the Cement Key That can be Removed to Give Access to the Outlet Pipe

trap so formed for the discharge pipe is provided with a removable cement block, or key, that fits in a key seat directly opposite the opening. Projecting from it is an eyelet, and whenever the outlet becomes clogged, a workman can get at the pipe by inserting a hooked pole into the basin and withdrawing the key. Then, with the aid of a hollow guide, he can force a sewer rod into the pipe and remove the obstruction. On completing the task the key is replaced. In this way the practice of breaking away the trap wall is made unnecessary.

ROMANTIC STORY IS ADDED TO LORE OF ITALY'S FLAG

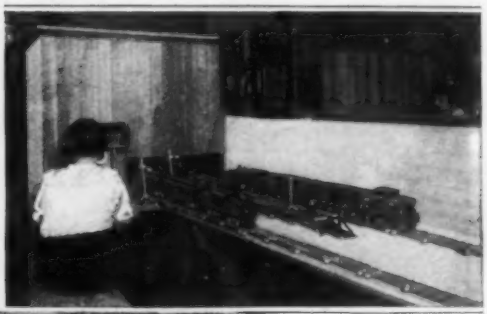
When the Italian forces made their superb attack upon the Austrian positions and triumphantly captured Monte Santo last August, a picturesque scene was enacted that contributes a romantic story to the history of the national emblem. Three columns, operating from different points, combined in carrying out the remarkable assault. Before the actual advance was begun, an Italian flag—which consists of three broad vertical stripes of green, white, and red—was cut into three pieces and one of the colors given to the leader of each column. When the forces, after a bitter, terrible struggle, met at the summit of the mountain from which they had routed the enemy, the three parts of the tricolor were sewed together and the standard unfurled above the ruins of an Austrian church. This announced the Italian victory to troops occupying Monte Sabotino and surrounding heights. When the restored flag was sighted, the cheering of the soldiers echoed for miles through the mountains.

¶A certain factory has succeeded in deadening the noise made by trucks running over a cement floor by covering it with heavy tar paper, laid with cement paint.

It Was above the Standing Wall, at the Right, That Italy's Mended Standard was Unfurled to Announce the Triumphant Capture of Monte Santo. The Picture Shows the Ruins of the Austrian Church That Was the Scene of the Flag Romance

GIRLS STUDY TELEGRAPHY AIDED BY TINY TRAINS

Demonstrating to Women Telegraph Students the Operation of a Railway Signal



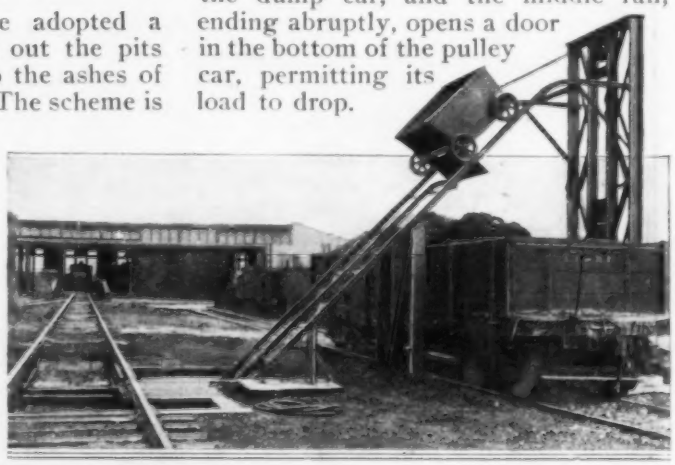
A Pupil Engaged in the Equivalent of Actual Railway Work on a Two-Track Line

Girls Engaged in Preparatory Work Which Consists in Learning the Morse Code and in Acquiring Facility in Sending and Receiving Messages

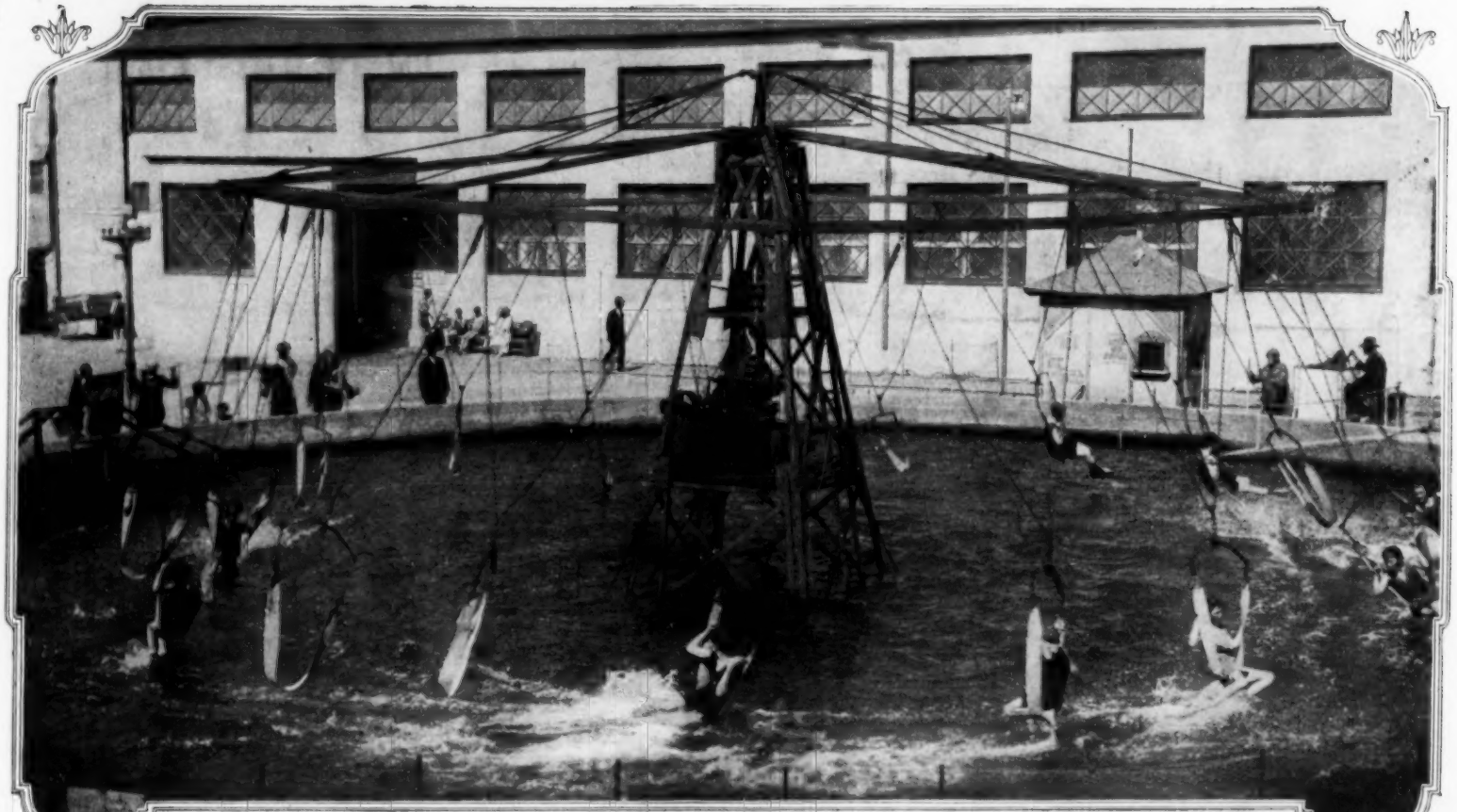
Tiny electric-railway trains, running on tracks provided with switches and block signals that duplicate actual railroad equipment, are among the first features to attract attention in the Pennsylvania Railroad System's school of telegraphy which it has recently transferred to Philadelphia. A course has been opened for women and girls, as well as men, and already there is a large number of applicants. After the pupils have learned the Morse code and attained some proficiency with a telegraph key and sounder, they are given practical experience as block operators on the miniature railway, receiving orders from a dispatcher just as if they were in actual service. On completing the training, which occupies six to eight months, the pupil is assured of a position with the road.

CINDER CONVEYOR CLEARS ENGINE ASH PIT

Several railroads have adopted a new method of clearing out the pits into which firemen dump the ashes of locomotives after a run. The scheme is simple and economical. A strong metal frame, about 20 feet high, is erected near by, along a track on which an ordinary dump car may run. A three-track incline runs from the top of the frame down into the ash pit, and a small car attached to a pulley, with a counterweight, is run down the incline into the pit, where it receives the ashes as they are raked down by the fireman. It is then pulled up the incline over the dump car, and the middle rail, ending abruptly, opens a door in the bottom of the pulley car, permitting its load to drop.



The Small Car on the Incline Runs Down into the Ash Pit beneath the Railroad Track at the Left, and There Receives the Ashes from a Locomotive, Hoists and Dumps Them into the Waiting Gondola



BATHERS GET NEW THRILLS IN WHIRLING SEA SWING

IT is a far cry from the "old swimming hole" to this modern bathing pool with its mechanical means of entertainment. The rough spring board has given place to a motor-driven sea swing, in this instance. As the big wheel begins to move, the occupants of the swings attached to its circumference are splashed from head to foot, but presently they are swung far out to one side, above the water. The next instant, perhaps, they are plunged again into the pool by the slackening of the wheel's speed.

ARTIFICIAL FLOOD USED TO MOVE COAL BARGES

Twelve thousand tons of coal were brought down the Ohio River last summer by a fleet of barges which were floated on the crest of an "artificial flood." Never before in August had such an event taken place on the Ohio, and it happened only because one man stepped in to aid nature in the undertaking. The Ohio River is always at extremely low water around the month of August, and boats drawing much more than a couple of feet of water normally are tied up.

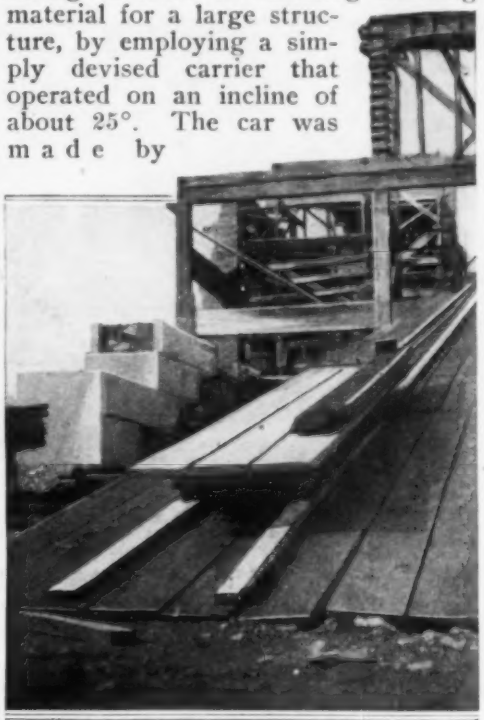
But the United States Army Engineering Corps, wishing to demonstrate the supreme value of the river as an artery of traffic in war time, stepped in with an illuminating demonstration of what can be done even in the weeks of scant flow. Dams holding back pools along the Big Sandy, the Kanawha, and the upper Ohio rivers were opened a few weeks ago and surplus water was allowed to run out. An artificial crest of from three to six feet was formed, and on the crest, snub-nosed argosies carried the fuel so urgently needed. Without the presence of the dams which the government has already completed, this movement could not have been made.

NEW OILCAN HAS TWO COMPARTMENTS

A dual compartment in which a lubricant and gasoline, or other liquids, may be contained separately, is provided in a disk-shaped oilcan that has lately been invented. A pair of spouts, or one spout and a plug that may be used interchangeably, is supplied. It is conceivable that the device would prove a convenience to many workmen.

CARRIER ON INCLINE USED TO ADVANTAGE BY BUILDER

A contractor effected a considerable saving of labor in handling building material for a large structure, by employing a simply devised carrier that operated on an incline of about 25°. The car was made by mounting a plank platform on two dollies and was drawn up the incline by the same engine that operated the brick hoist. It descended by its own weight. Two-by-fours were spiked down on the inclines to serve as a guide for the car. Roof trusses weighing 3,000 lb. were easily carried up by this means, and later in the course of construction, the carrier was used to take up three wheelbarrow loads of mortar at a time.



Simple Carrier Made by Mounting a Platform on Two Dollies: It was Operated by a Hoisting Engine and Elevated Three Wheelbarrow Loads of Mortar at a Time, as Well as Heavy Steel Girders

¶As a part of the special uniform for American sailors on submarines, submarine chasers, and other craft where the men will be much exposed, the Navy Department has purchased 200,000 wind-proof shirts, costing $2.52 each.

NEW FEATURES IN DINING OUTFIT FOR AUTOS

A combined dining and kitchen outfit has been built to be carried on the running board of an automobile and in several respects is different from other devices of similar purpose now on the market. When packed, it measures 12 by 24 by 28 in. It consists of a cabinet of enameled metal inclosed in a wooden case. The sides of the latter are hinged at the top, and on being drawn into a horizontal position form a table measuring 2 by 5 ft. The case is divided into numerous compartments, the lowest of which contains a collapsible stove, a coffeepot, a skillet, and a pan in which the table dishes are packed. Above this space are partitions for containing four jars, two bottles, and provisions. In addition, there is a tin food box, 9 by 9 by 12 in., and, at the top, space for five folding camp chairs. The entire outfit weighs but 40 lb., and when packed is so arranged that there is no rattling. Only a moment is required to set it up.

A View Showing Two Combination Dining and Kitchen Outfits: One is in Place on the Running Board While the Other is Opened Up Showing the Complete Equipment

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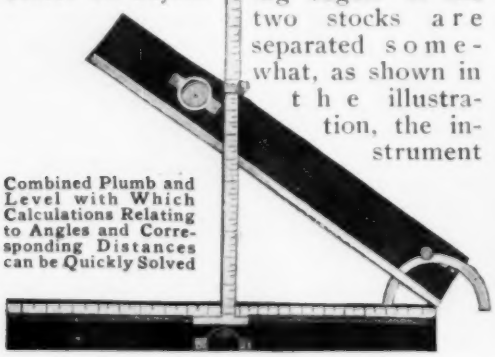
HINGED PLUMB AND LEVEL FOR RAPID COMPUTING

An instrument with which a variety of trigonometrical calculations can be made is a computing plumb and level, the principal parts of which are two 24-in. stocks hinged together and having graduated scales on adjoining edges. If the two stocks are separated somewhat, as shown in the illustration, the instrument may be described as resembling a letter "A" lying on its side. The upper leg is the plumb stock and the lower one the level stock. Corresponding to the cross arm of the "A" is a 24-in. rule that stands at 90° to the level stock and can be slid back and forth on it. It passes through a sliding attachment on the plumb stock. Attached to the hinged end of the level is a graduated metal semicircle which passes through a slot in the other arm. In each stock is a gravitating plumb, that in the upper arm registering from horizontal to 90° and that in the lower arm, or level, registering from level to 10°. By referring to the various graduations a variety of problems relating to angles and corresponding distances can be quickly solved. The instrument is particularly convenient for builders because it can be folded up and packed in small space.

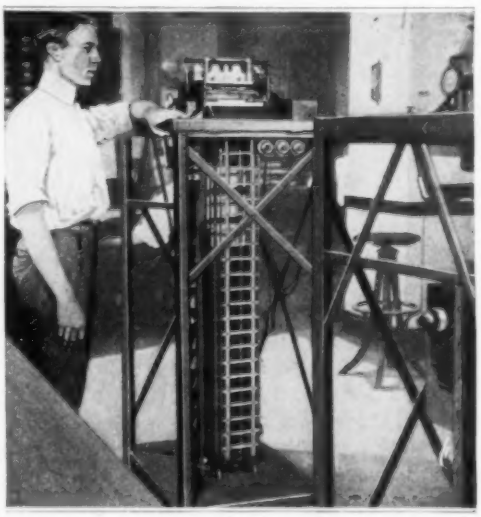


Combined Plumb and Level with Which Calculations Relating to Angles and Corresponding Distances can be Quickly Solved

A Battery of Adding Machines Which Automatically Handle a Railroad's Record Cards, Making It Possible to Ascertain in Very Brief Time Such Items as the Total Weight of Certain Commodities Shipped between Two Given Points

ANSWERING RAILROAD QUESTIONS BY MACHINERY

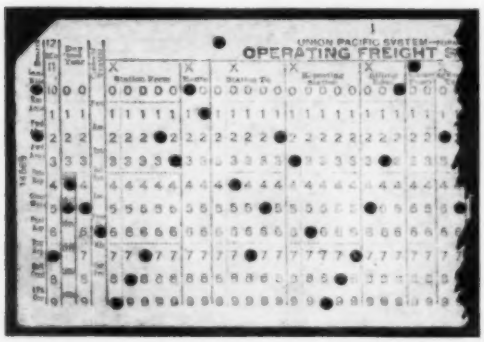
TO many persons it may be a source of wonder how a railroad company is able to answer isolated questions such as the amount of freight shipped in a year's time from one town on the line to some other town miles away or tell the individual amounts of scores of commodities handled in a specified period. The growth of the powers of the Interstate Commerce Commission and the creation of railway commissions in the several states have resulted in demand upon the railroads for answers to all sorts of inquiries. Because of the complexity of railroad affairs the information no longer can be carefully pieced together out of station reports as was the case years ago. The Union Pacific Railroad maintains for this purpose a system whereby almost any question arising in the auditor's office can be satisfied in a very short time without access to books or the detailed statements sent in by the freight agents along the route. The work is done by machinery and the answers are found practically automatically.



Sorting Machine Which Separates the Perforated Record Cards According to Any One of Numerous Classifications

When the daily statements arrive at headquarters from the various stations every item represented on the report is transferred to a card by means of punched holes. The cards are covered with hundreds of numbers in columns. Each station on the line has a number, and so, by punching out

certain figures, the station from which the goods were shipped, as well as the station to which they are consigned, may be represented. Punching out figures in other columns indicates the kind of commodity, weight, revenue, day of month and year, class of traffic, or other information.



One of the Cards Which Form Permanent Records of Every Item of Freight Shipment

From thousands of cards of this sort any information may be obtained. For instance, it is desired to know the amount of freight shipped from one station to another in a certain length of time. Apparently it would be an endless task, but in reality it is simple. The cards are run through a sorting machine which automatically picks out all the cards representing freight shipped to the first station. The sorting machine is set to operate in a particular column and distributes the cards in pockets according to the position of the punched holes. Then the cards are again sorted to separate those representing the freight coming from the second station. Either part of the work may be done first. In practical use the operations are carried out on a much larger scale and the individual station cards all sorted out at one time.

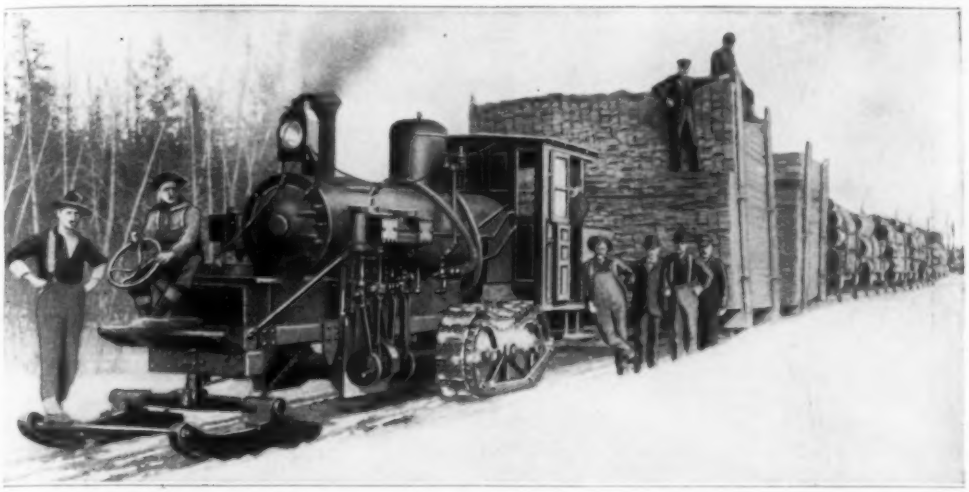
The next step simply consists in putting the assorted cards through an adding machine which, according to the way the figures are punched out on other parts of the cards, adds the total weight and revenue derived from business between the two stations. By similar methods the cards may be sorted out to represent any day, month, or kind of commodity—in fact, any detailed question relating to the handling of freight for any period. The desired information may thus be obtained in a short time, whereas under the old plan it would be almost an endless task.

MOVIES SENT TO RUSSIA TO HELP WIN THE WAR

Motion pictures are to be used on a vast scale in Russia in a campaign which, it is believed, will greatly aid the allies' cause. Because filmed drama can be understood by people of all languages it is being used to carry a message of inspiration and reassurance from this country to Russia's millions, many of whom are illiterate. A scenario has been prepared and produced and 50 copies of the picture, with all captions in Russian, have been dispatched to Russia. The film aims to show the Muscovites that they have been misled in so far as they feel that the United States is not in earnest in this war. The scenes depict the experiences of a typical Russian peasant who comes to this country to see for himself its resources and to ascertain its purposes. Ivan, as he is called, visits Pittsburgh steel mills and Detroit aeroplane factories, he watches Secretary McAdoo sign a warrant for a loan of $100,000,000 to Russia, and he has a glimpse of the $7,000,000,000 in gold bullion in the subtreasury in New York, awaiting war use. Motion-picture theaters are scattered all through Russia, many of them in small villages and at the front. It is proposed to show these pictures in every amusement center within the next few months.

STEAM ENGINE PULLS TRAIN OF LOG SLEDS OVER SNOW

Those who are familiar with the history of the steam engine will recall that the first locomotive was operated on an ordinary highway. In this connection it is interesting to note that an engine is being used in a Wisconsin lumber camp during the winter months to



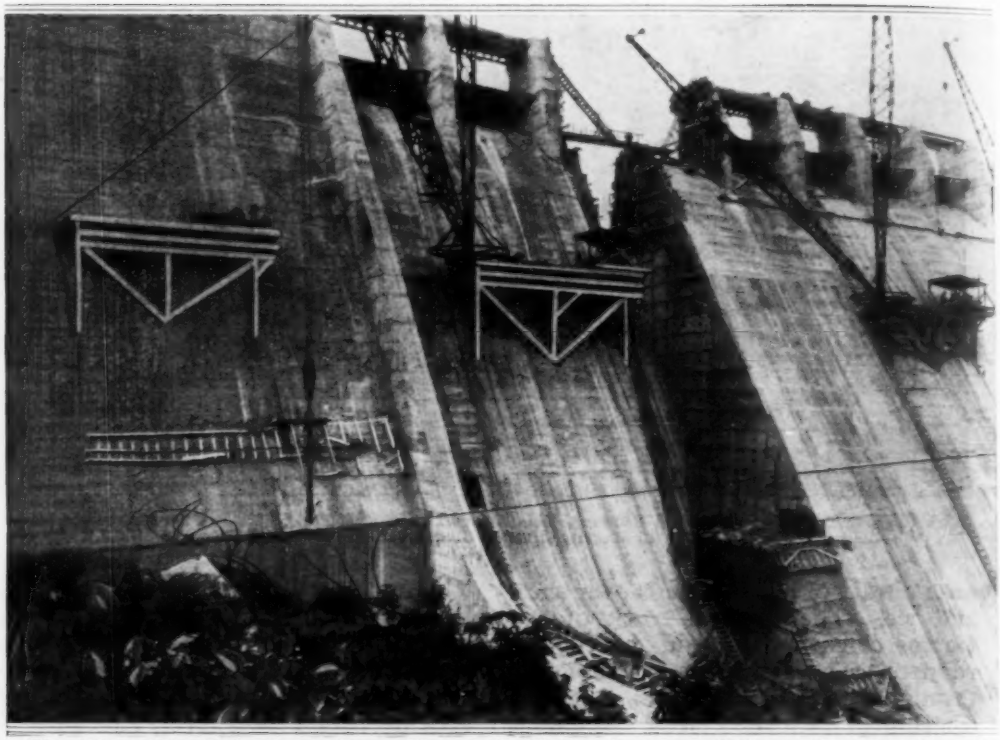
With Creeper Treads and Forward Runners, This Steam Locomotive Makes Six or Seven Miles an Hour While Pulling 15 Heavily Loaded Sleds over Snow-Packed Roads

haul a train of logging sleds over snow and ice. The forward truck of this tractor consists of a pair of steel-clad runners. The driving is accomplished through a creeper tread. When pulling a string of 15 loaded sleds, the engine maintains a speed of six or seven miles an hour. In service it has proved economical. A crew of four men, consisting of a steersman, engineer, fireman, and brakeman, is adequate for its operation. The scarcity of timber in the district is continually increasing the length of hauls and lessening the practicability of constructing tracks for logging trains. Reduction of transportation costs is therefore necessary for the profitable exploitation of the remaining timber. The "steam sled" outfit is doing this satisfactorily during the three or four months the snow-covered roads permit heavy traffic.

SERVICE AND CONVENIENCE IN SHOE-SHINING OUTFIT

New equipment for the bootblack is being introduced which is manifestly superior, from the patron's viewpoint at least, to paraphernalia in common use. The stand is supplied with adjustable chairs and foot rests that eliminate the gymnastics usually required when one climbs to and from the seats. The foot rests are out of the way and the chair lowered to a natural height when a customer steps on a nine-inch platform and seats himself. The operator elevates the chair the desired degree by actuating a lever, and adjusts the pedals to a convenient position. Revolving brushes driven through flexible shafts by an electric motor replace rags and manual brushes. For polish-

Adjustable Chairs, Disappearing Foot Rests, and Electric-Driven Brushes Are Outstanding Features of This Shoe-Shining Outfit



Close View of the Hydroelectric Power Dam on the Yadkin River near Whitney, North Carolina: Its of Which are Shown Here. Building Material was Brought within Reach of the Derricks on Flat Cars

ing, a special yarn brush is employed. In this way all parts of a shoe, instead of merely those easy of access, are polished evenly. The brushes remove dirt from the crevices in the leather, instead of rubbing it in, and leave the shoes perfectly dry. Their effect on the feet is not unlike that of an electric vibrator and the operation is therefore a restful, pleasing one even to those who have corns that occasionally cause them to avoid bootblacks.

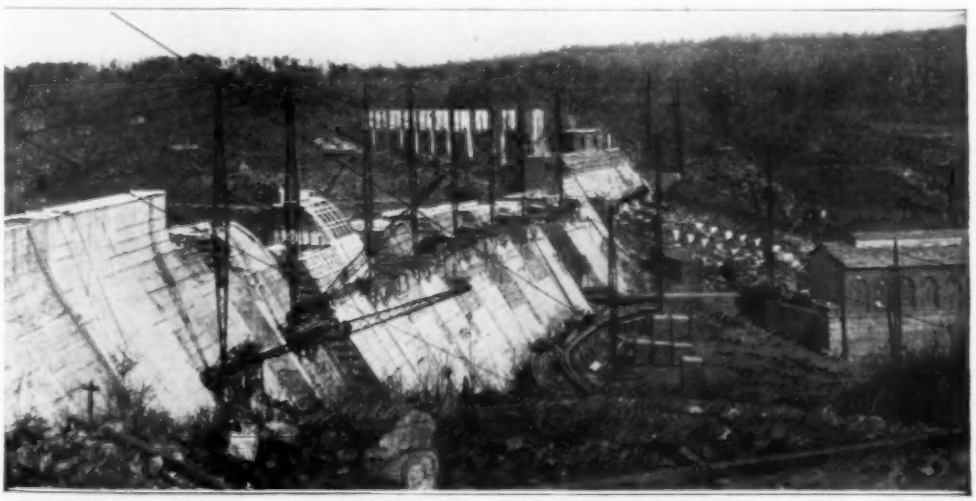
FIFTY DERRICKS EMPLOYED IN BUILDING BIG DAM

For several reasons widespread interest attaches to the big dam which is now nearing completion on the Yadkin River just below Whitney, N. C. Many who have studied the fuel resources of the Southeast believe that the building of this immense structure, together with a hydroelectric plant, points to the day when the fuel problem, at least in this region, will be solved by similarly utilizing other waterways. The plant will generate an average of 45,000 kilowatts, or about 60,000 horsepower.

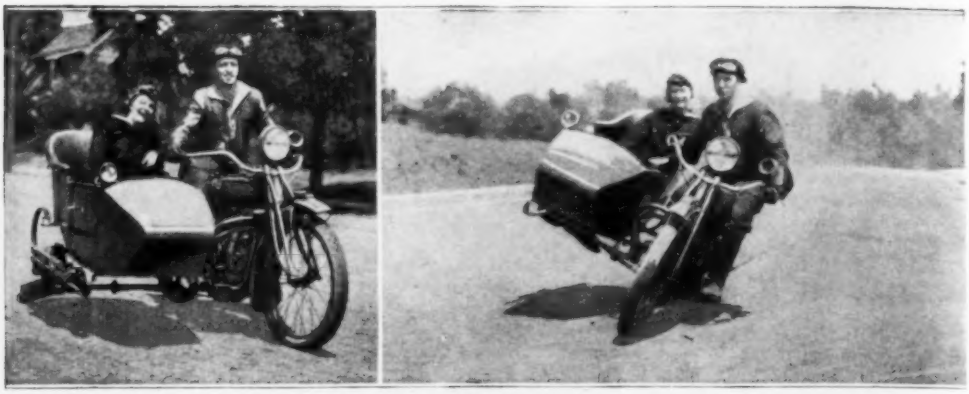
The methods of construction employed by the engineers greatly expedited the work. No less than 50 derricks, each with a lifting capacity of 25 tons, were utilized all at one time in hoisting material from a network of railroad tracks laid as close as the available space would permit. The derricks were at first stationed at the base of the dam and then lifted to higher ledges as the work progressed. Material was brought within their reach on flat cars of 100,000-lb. capacity. The massive curved wall is 1,300 ft. long, 220 ft. high, 160 ft. thick at the base, and 20 ft. thick at the crest. When the reservoir is filled, the water will cover 5,000 acres. The cost of

Construction was Greatly Expedited by the Use of 50 Derricks of 25-Tons' Lifting Capacity Each, Some Capable of Carrying 100,000 Pounds Each. The Power Plant will Generate an Average of 45,000 Kilowatts

the structure, including that of the electrical installation, will be $10,000,000. The order for the cement used in the dam was one of the largest on record, it is said. The dam is of Cyclopean concrete, rocks ranging up to sizes weighing 15 tons being imbedded in the great broad-based wall which stretches across the valley at a point where it is comparatively narrow. Four years have been required in building it.



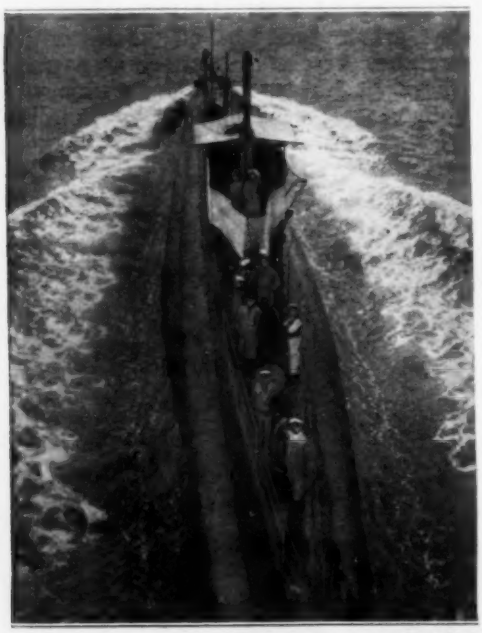
General View of the Dam Which Is 1,300 Feet Long and Has a Maximum Height of 220 Feet: When Filled, the Reservoir Which It Creates will Cover 5,000 Acres



At the Left the Drag is Shown in Place and the Sidecar Supported at Its Normal Height. This Enabled a Quick Start. The Other Picture Explains How the 25-Mile Trip was Made with the Vehicle Balanced

CHILEAN SUBMARINES READY FOR FINAL TESTS

Submarines that have been under construction at the Charlestown, Mass., Navy Yard for the Chilean government are now completed and ready to make the journey to their home ports. A few weeks ago the vessels passed through the Cape Cod Canal en route to New London, Conn., where they were to be given their final tests.



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One of the Submarines Lately Constructed in This Country for the Chilean Navy, Passing through Cape Cod Canal before Undergoing Its Final Tests

LOST WHEEL FAILS TO STOP SIDECAR TOUR

When a motor truck skidded and smashed the wheel of a passing sidecar, the cyclist and his passenger, some 25 miles from their destination, did not abandon the tour. The broken wheel was removed and a drag constructed. With it in place, the sidecar was supported so that a start could be made. It is an easy matter to throw a motorcycle and sidecar into an inclined position by attaining a fair rate of speed and turning the front wheel quickly to the right so that centrifugal force tilts the machine in the opposite direction. Then by alining the wheel, it is possible to travel straight ahead with the vehicle balanced and the sidecar wheel raised a foot or so above the road. The motorcyclist employed this scheme and elevated the sidecar until the drag was free from the ground. Maintaining a speed of from 25 to 30 miles an hour, he completed the trip, even negotiating curves with the outfit balanced. The distance was covered in schedule time without difficulty.

¶ It is reported that submarines are now being built without periscopes, a system of two lenses, one on either side of the vessel, being used instead. While such a device is more difficult to discern from a distance, it requires the submerged craft to travel nearer to the surface of the water.

COMMENT AND REVIEW

OUR feeling of abhorrence toward a nation which has cast aside all the traditions of civilized warfare, that puts arsenic in wells, that places ground glass in food, that hurls broadcast disease germs for man and beast, that hands out poisoned candy to trusting children, that intentionally bombs hospitals filled with sick and dying, that tortures its prisoners of war, that marches its school children with waving flags on a special national holiday when a "Lusitania" filled with helpless women and children goes down—this feeling does not apply to those who themselves, or whose parents, though born in Germany, are loyal, true Americans. Special honor to all those who have already volunteered to fight under the Stars and Stripes to rebuke such wrong, or who have taken a pronounced stand against such iniquity! It remains, however, for many others who call themselves German-Americans, to come out squarely and unmistakably, and thus render impossible any suspicion of disloyalty. The resident here of whatever foreign descent owes it to the country of which he is voluntarily a citizen, and to himself, to do this. If he cannot do this, he should either return to that other country whose citizenship he places above ours, or expect here the same treatment which his preferred foreign country is accustomed to administer in such cases.

No Middle Road

LIKE the mighty giant that it is, the United States is awakening from its long slumber and rousing itself to action, although in some respects it may be said to be just rubbing its eyes. The past 40 days have visualized more of what is being accomplished than the previous five months. Vast camps, each with a soldier population of large cities, have sprung into being like magic, and have been populated almost between sunrise and sunset. Officers and men in uniform are seen on every street, trains loaded with troops are moving with precision and promptness; nearly a million men are busy with intense training. While a modern soldier cannot be made in a day, it may be said in all modesty, because true, that the transformation worked in men with only three weeks' training, is remarkable. This is because the young American puts his whole soul into his work. In the officers' training camps, men who 20 days ago sat in comfortable office chairs or lounged in fashionable clubs, are making their practice hike of 20 and even 30 miles a day and returning at dusk to put in two or three hours hard study before bed.

Making an Army

As I write, the stirring notes of a large marine band are heard as hundreds of naval recruits in white uniforms drill on their lake-front camp grounds, across the street. An hour ago, a full thousand of militia—not long back from the Mexican border—passed in heavy marching order, going—somewhere: but that somewhere will find every man ready, resourceful, and intrepid. Such is the material out of which the American army is being formed. An army which can be depended on to give a good account of itself—an army of which we are all proud.

IT is fitting that we should cheer the boys as they go forth to camp and front, but there is a no less important work for all of us who remain. The very spirit of freedom of personal belief and action which brought this nation into being, and preserved it through more than a century, has had the inevitable result of making us too easy-going and tolerant of many things. What if the man who fled his own country, or came here to secure for himself and family the advantages his fatherland denied them, did speak with disrespect and even contempt of this free land of his choice? His was only one voice in a multitude, and so, what did it matter? The melting pot would eventually refine him and

The Test of Loyalty

eliminate the dross. That attitude, though wholly wrong in ordinary times, becomes criminal in days like these. Moreover, the giant is beginning to rub his eyes and discover that the voice comes not from unrefined metal, but from pure dross, and when organized by years of skillful propaganda, and fostered by foreign gold, creates a condition which as yet is not realized. It seems repugnant to question the sincerity and motives of those living in the same block, with whom we ride to and from our daily work, who have been even respected citizens in our own community. The Belgians and French and English in whose homes and schools and offices German spies by thousands had been living and serving acceptably for years, once indignantly repudiated any thought of insincerity. They have since learned their bitter lesson, and are we also to learn our lesson by the same costly method, or shall we profit by their experience?

Is it conceivable that the hundreds of incendiary fires and bombs in factories and harbors; the inspired strikes in all parts of the land; the concealed and open hostility to all efforts properly to equip and defend ourselves during the past three years, were all due to special agents sent over here for the express purpose? Or was it part of the same insidious world-wide spy system which in a time of peace honeycombed the departments of national government in every land, reaching in its audacity and insolence even to the spending of money in the attempt to bribe our own Congress?

There can be but one answer; and there should be but one treatment of the evil.

We will have to awaken to the danger which lurketh in darkness, and in self-protection nerve ourselves to the extreme, drastic punishment which all nations, in all times, have meted out to the traitor and spy—death. Are we prepared as individuals and communities to do this; is public sentiment strong enough to commend and uphold the government when it shall take your next-door neighbor red-handed in assistance to the enemy, and a court-martial having unquestionably established his guilt, sentence him to the firing squad; what will be your position in such a case? Is your love of your country, whom the convicted one has tried to destroy and done his bit to deliver into the hands of the enemy, strong enough for you to say "Amen," or will you weaken and plead immunity "in this one case"?

Thousands who read these words have, with sad yet glad hearts, parted with sons and brothers and relatives who have begun their journey to the front. There they will face bullets and shells and poison gases. Shall you and I, at home, be any less brave in exacting the extreme penalty on those who are fighting our boys, not face to face as soldiers, but through the most cowardly and insidious methods behind their backs?

There is no danger of misjudging anyone, for there is now no middle ground—either you are an American to your last drop of blood or you are not.

The giant is rubbing his eyes; you can by your own pronounced expression do your bit to fully open those eyes.

Do the Germans Want Democracy?

EVENTS have already given several severe shocks to our fancied security, but we are still, many of us, reassuring ourselves with the thought that it was the ambitions of the kaiser and the power lust of Prussian officers, who dragged the German people and the world into the present hell on earth. As a result of hasty or careless thinking, or lack of thinking in the past, we have already had our confidence in many German ideals shaken and shattered. The intrigues with Russia; the attempts to involve us with friendly nations—Japan and Mexico—will suggest others. Are we sure, or does the belief merely express a hope, that the German people have no heart in this war and the scheme of world domination? In short, do the Germans really want democracy, or is it only that we want it for them? A good deal is made of the ambitions of the socialist party in Germany, but what of their strength? So far, reports chiefly have to deal with socialists being pushed out on the firing line as fast as recognized.

The scratch made in the sapling becomes a great scar in the tree of four decades; the grooves cut in rock by the slowly moving glacier withstand the sun and frost and rain of centuries; a child steps on the newly laid cement and the imprint remains for years. What then of the effect upon an entire nation, where the school and pulpit and controlled press teach but one thing, and that continuously from the cradle to the grave, "Germany over all," and that other "Might makes right"? As we are by nature quick of eye and limb and speech, so too are we liable to be hasty in thought, and with a wish of only good to all the world, we may easily ascribe to a foreign nation a conscience which it does not know.

It matters not who the offender may be—the man who for a price becomes the incendiary of munition works, or the man who by public speech or in public print, becomes an incendiary of patriotism, loyalty, and national morals; who incites insurrection, high or low; whatever his position or degree, he who by word or deed would betray the country becomes a traitor, and should die the traitor's death.

No Peace until Lasting Peace

WHY does Germany want peace? Is it because she is starving? Though short on some foods, and many luxuries, there is no sound basis to expect she will fail through famine.

Is it for want of materials with which to fashion ammunition? The stores of ammunition piled up during many years in preparation for this war have been exhausted, but in the meantime vast ammunition works have been developed with the well-known German efficiency.

Is it on account of men? Germany has yet millions of her own subjects, and can conscript millions more in Austria, Turkey, Roumania, Serbia, and the other small countries.

Germany adroitly sets in motion peace terms which are sent to her and the allies, because Germany has now possession of, and administration over, a territory amounting to nine-tenths of the territory which she determined in 1905 should be her prize in this war. That territory stretches unbroken from Hamburg to the Persian Gulf. The other one-tenth is not worth fighting for —now. With this vast territory in control, German officers in command of all their armies, German officers in their offices of state, peace only is required to weld the whole mass into a greater Germany. A few years of peace, of systematizing the subject countries, of cannon foundries and munition works piling up engines of war, of building air fleets and submarines, and intensive farming such as Germans know so well, and the menace to the world will be many fold greater than it was even in 1914. If this is a dream, it is no idle dream, but the carefully worked out plan which has been taught in German kindergartens for a generation.

H. H. WINDSOR.

September Twenty-fifth.

PRIVATE CHURCH IS BUILT FOR LARGE FAMILY

In a quiet, timbered spot easy of access, a man of devout tendencies has recently constructed a simple, attrac-

In This Little Chapel, Situated in a Clump of Trees on a Knoll Where Two Roads Meet, a Family of 33 Members Worships in Private

tive little church where, with his sons, daughters, and grandchildren he listens to the words of a clergyman of his own choosing and worships in the privacy of his own family. The chapel was built during the past summer and the deed to the property turned over to the bishop who presided at the dedication services. The three generations embrace 33 individuals, 19 of whom are grandchildren. When the weather is enjoyable, the family gathers at the morning service and then joins in a picnic on the grounds until it is time for the evening meeting.

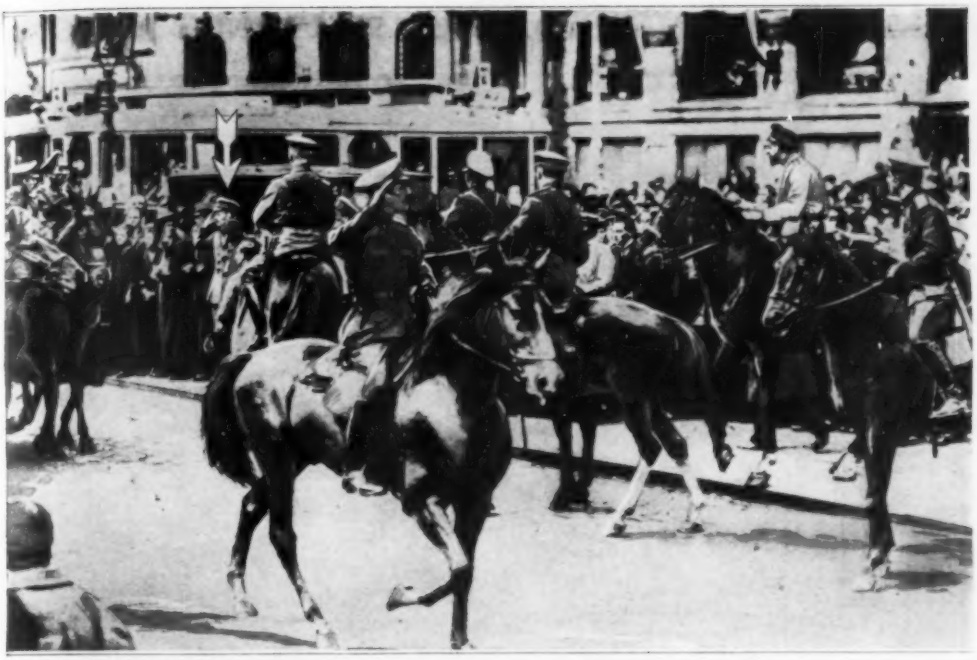
HOW TO SEND CHRISTMAS GIFTS TO SOLDIERS

As the holiday season approaches hundreds of thousands of Americans are planning to send gifts to the soldiers away from home and it is very important that the postal regulations and suggestions, especially regarding mail to our forces in Europe, be observed. Packages for members of our forces in England or France should be mailed six weeks before Christmas, if possible. They may not weigh over 20 lb. and are sent at the eighth-zone rate, which is 12 cents per pound. The contents are not subject to duty.

Special instructions are given about addressing mail to our soldiers in Europe. The first line of the address should contain the name and military rank of the person to whom the package is sent, the second line should state the military unit of which he is a member, adding the branch of the service, as, infantry, cavalry, or artillery. The third line should state "American Expeditionary Force in Europe," rather than the name of any city or station. Mail sent to men in the national-army cantonments or national-guard mobilization camps in this country should bear an address as indicated above, except that in place of the last line, the name of the camp and the state in which it is located should be given. The sender's name and address should always be written on the outside of every package.

Certain department stores in this country have instructed their European representatives to make up special packets of dainties, tobacco, camp utensils, etc., which persons in America may order sent direct to their soldier friends at the front. Orders of this sort are placed with the store here which forwards it to London, or wherever its representative is located. On the arrival of the order abroad, a special packet of the character designated is dispatched to the soldier's address. While the Red Cross does not accept or forward gifts for individually designated soldiers it is glad to receive donations suitable for Christmas and will see that all such are wisely distributed. Persons desiring to send gifts to soldiers in foreign armies should first consult their local postmaster to ascertain the special regulations provided for such cases.

¶An average of all the weather forecasts made by the Weather Bureau in all parts of the country for all seasons shows, it is said, that our "weather men" were correct in approximately 85 per cent of their predictions.



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Like a True Democrat, Premier Kerensky Mingles with the People. The Arrow Indicates the Russian Leader in Uniform Answering the Salute of Cossacks. The Latter are Keeping Back Crowds Assembled to Witness the Public Funeral of Comrades Recently Killed in Defending the New Government

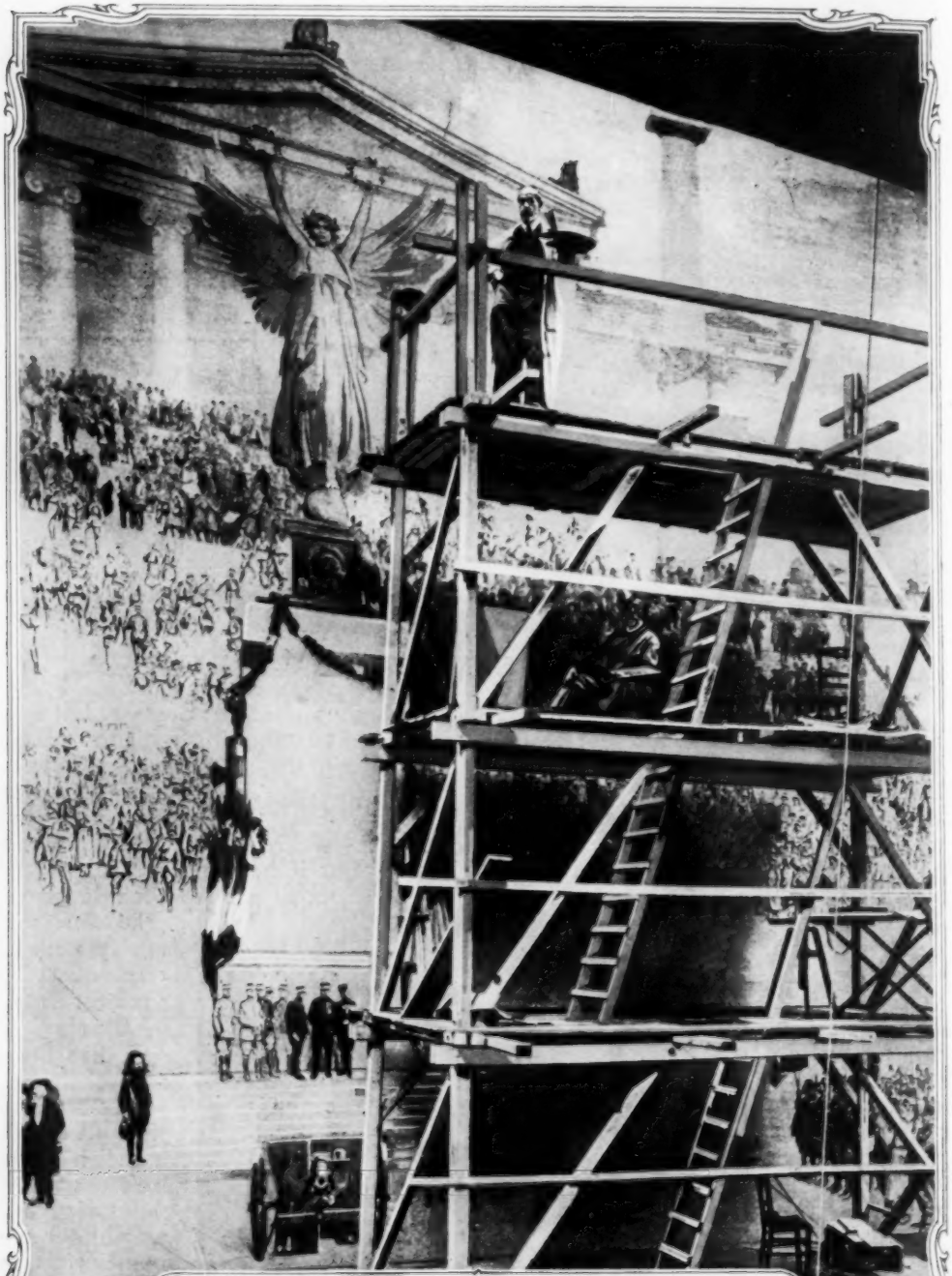
KERENSKY, RUSSIA'S MANY-SIDED LEADER

No figure in the great war has aroused more intense interest among the American people than that of Premier Kerensky upon whom, more than on anyone else, the fate of Russian democracy has rested. Enemies at home and abroad have plotted his downfall and his own generals have openly revolted against him but again and again this frail, intensely eloquent popular leader has emerged from crises with new power. One day he is at the front checking the defeat of the disorganized army, the next he is at his desk deciding momentous affairs of state. Later he may be seen mingling with the people who throng the streets as a parade or funeral passes. All in all he is a man of extraordinary strength and peculiar weaknesses. No one can foretell his destiny but if he survives the present terrible struggle he will surely rank as one of the greatest men of Russia.

Kerensky at His Desk: This Likeness of the Heavily Burdened Premier Reveals Much of His Remarkable Personality

It has been repeatedly reported that the premier's health has been at the point of giving way under the months of terrible mental and physical strain and that he keeps at his task by sheer will power.

HUGE WAR PAINTING BEGUN BY FRENCH ARTISTS



ON an enormous circular canvas that has been stretched on the walls of a war shrine known as "Le Pantheon de la Guerre," and situated on the grounds of the military school near Paris, a group of famous French artists have undertaken the execution of a remarkable panorama. The great painting will show the whole of the western front from Belfort to Calais, and will include immortal Verdun and the cathedral at Rheims. In front of a magnificent temple appears the winged figure of Victory and on the stairs of the massive structure are portraits of distinguished military and civilian personalities of the war.

SOLDIERS KNEEL AT SNOW ALTAR HIGH IN ALPS

On the Crimson and White Battle Ground in the Rugged Alps Where Our Italian Allies are Defending Their Honor and Upholding the Ancient Tradition of Their Forefathers: Soldiers Attending Military Mass before Joining Their Comrades in a Concerted Assault against the Austrian Positions. The Altar, before Which the Priest is Standing, is Built of Snow and Ice

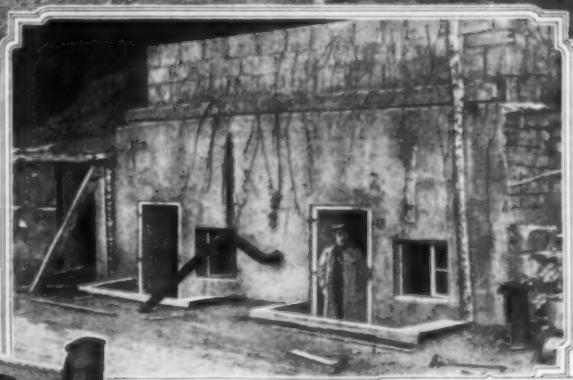
FORTIFIED FIELD POSTS AND UNDERGROUND

This Queer-Looking Structure, Which from a Distance Is Nondescript in Form, Once Was an Important German Lookout Post from Which Artillery was Directed and Enemy Movements Watched with the Aid of Strong Binoculars

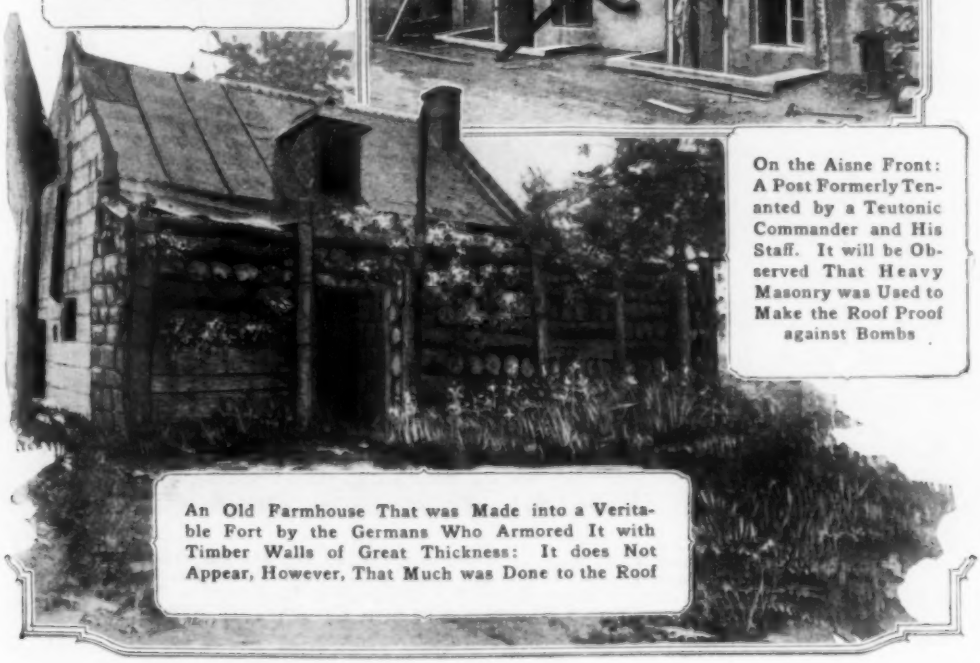
Amid the Ruins of a French Village Which was Occupied by the German Invaders for Many Months Before They were Finally Dislodged by the Allies: Heavy Stone Walls Shield the Entrances to Underground Works Which had been Projected under Most of the Town. The Picture Is Typical of Conditions in Scores of French Villages

WORKS ABANDONED BY GERMANS IN FRANCE

Heavy Timbers and Reinforced Concrete were Used Here in Fortifying the Roof of a Subterranean Post Occupied by the Germans in a Forest on the Western Front. It Is an Excellent Example of This Type of Military Construction



On the Aisne Front: A Post Formerly Tenanted by a Teutonic Commander and His Staff. It will be Observed That Heavy Masonry was Used to Make the Roof Proof against Bombs



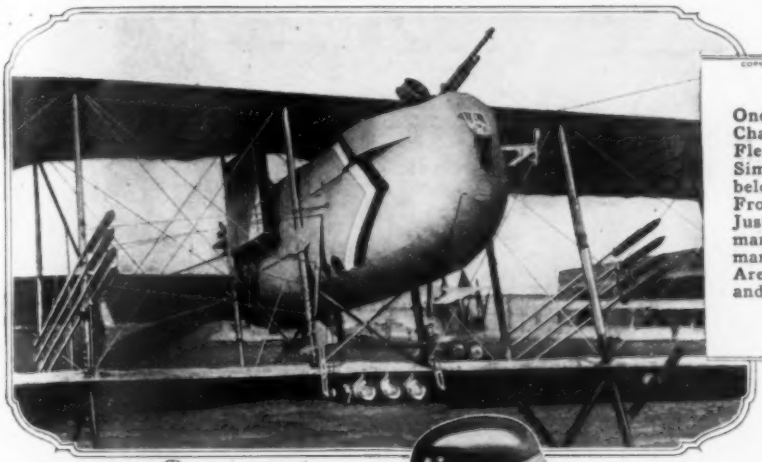
An Old Farmhouse That was Made into a Veritable Fort by the Germans Who Armored It with Timber Walls of Great Thickness: It does Not Appear, However, That Much was Done to the Roof

STRIKING NAVAL PHOTOS FROM SUBMARINE ZONE

Aboard One of the Watch Dogs of the Sea: A French Torpedo Boat Ready for Action in the War Zone. The Picture Shows a Machine Gun Mounted on Top of a Torpedo Tube and Manned by Marksmen Who Maintain a Continual Vigil for Enemy Air Craft

Remains of a German Submarine on the Sands near Calais: The Sea Raider became Stranded on the Beach and had to be Abandoned by Its Crew. Before Leaving It to Its Fate, the Vessel was Blown Up, with a Result That Is Apparent. In the Illustration Several French Marines may be Seen Examining the Wreck

NEW EQUIPMENT FOR AIRMEN HERE AND ABROAD



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One of the Latest Zeppelin Chasers in the French Air Fleet: A Rapid-Fire Gun, Similar to the One Shown below, is Mounted on the Front of the Car, While Just beneath It Is the Airman's Figurehead, or Talisman. Between the Planes Are Sets of Signal Rockets and under the Lower Plane Are Searchlights

A New Rapid-Fire Gun for British Battleplanes: That the Methods of Arming Aeroplanes have Undergone Swift Evolution during the War is Shown by the Picture on the Right. This Newly Designed Weapon for British Fighting Air Craft Is Capable of a Fire Whose Rapidity and Force Is Terrific

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Just as the Navy is Living Up to Its Reputation of Being "the Best Fed and Best Clothed Navy in the World," so Every Effort is being Made to Provide Amply for Our Land and Air Forces. This View of the Interior of a Bunk House at a Government Aviation School Shows the Excellent Quarters of the Men Who are Training to Be the Army's "Eyes." The Comfortable Beds, Each with Plenty of Blankets and a White Pillow, and Also the Army Trunks, would Doubtless be Much Envied by European Airmen

ITALIANS EMPLOY UNUSUAL MEANS TO KEEP

What Strange Forebodings may have Passed through the Minds of This Group of Austrian Soldiers When They were Blindfolded by Their Italian Captors before Leaving the Vessel in Which They were Detained, One can Only Conjecture. At All Events the Long Line of Ill-Clad Officers and Men Marching the Deck in Chain Formation and Stumbling down the Gangway Gave an Appearance of Going to Their Execution. However, These Blindfolded Men, Pawns in the Game of War, are Not being Led to Their Death, but for Some Reason, Best Known to the Italian Officers in Command, It was Decided That They should See Nothing of Their Surroundings on

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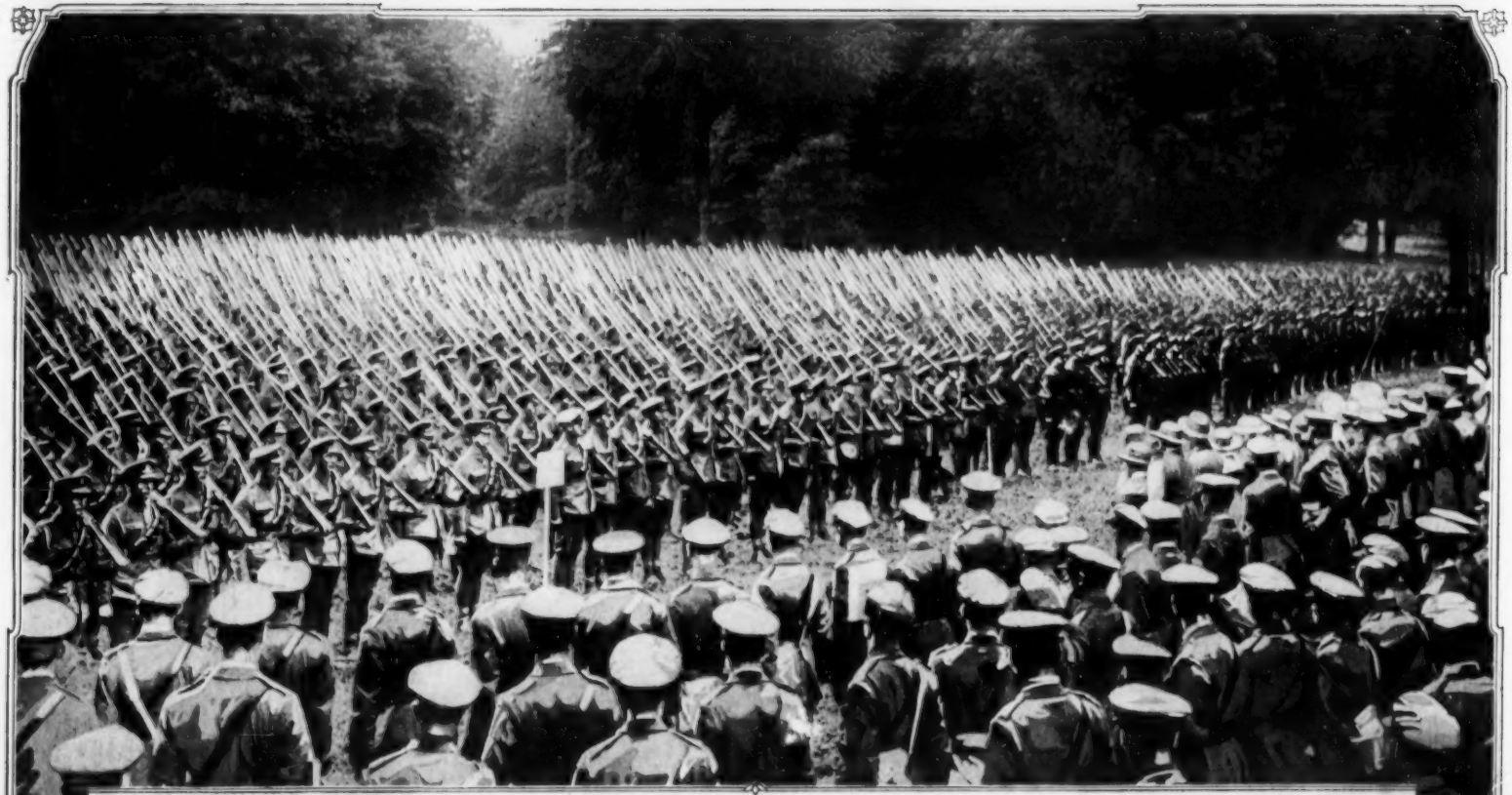
WAR SECRETS FROM AUSTRIAN PRISONERS

being Transferred from the Ship, through the Town, to a Railway Station. The First-Aid Bandage That Each Soldier Carries Proved Just the Thing with Which to Bind Prisoners' Eyes. The Precautions Taken in This Instance Reveal a Thoroughness Which Doubtless has Helped Make Possible Some of the Big Italian Gains That have been Recorded near the Adriatic in Recent Months. The Eyewitness Whose Sketch is Here Reproduced Describes the Men as Covered with Rags, Showing That Austria's Resources, at Least in the Matter of Equipment, are Sorely Depleted. Two British Officers are Standing at the Left Witnessing the Strange Scene



IMPRESSIVE PRAYER SERVICE MARKS WAR'S ANNIVERSARY

IT was in accord with British tradition, and likewise a fitting expression of the character of the cause in which the allies are fighting, that these British troops should mark the beginning of the fourth year of the war by assembling for prayer. That gathering of the kingdom's men was one of the most impressive ceremonies in its centuries of history. As the leaders gazed upon the men that supported the forest of bayonets it was inevitable that some, at least, should contrast the force of which these thousands were a part with the handful of soldiers that Great Britain possessed at the outset of the war. Shielded by the heroic soldiers of France, the British undertook the Herculean task of transforming a whole nonmilitary nation into a trained army. This gathering was striking proof of how successfully that task has been performed.

FRIENDLY THOUSANDS CHEER SAMMIES ABROAD

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Thousands of Britishers Packed London's Streets to View Our Khaki-Clad Soldiers. The Route Followed by These Newly Arrived American Troops Led Past Buckingham Palace Where King George Showed His Appreciation of This Country's Entry into the War by Reviewing Them. The Throng Shown Here Is at the Entrance to Whitehall

FRENCH OFFICIAL PHOTOGRAPH

Examining Each Other's "Shooting Irons": This Intimate Glimpse, Reproduced from a French Official Photograph, Shows a Sammy and a Poilu Each Curiously Studying the Other's Rifle

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It Is Not Discounting the Genuine Friendship Which has Long Existed between This Country and Great Britain to Say That a Few Years Ago It would have Been a Courageous Prophet Who would have Predicted That an Army, Marching under the Stars and Stripes, could Arouse the Whole of London to Wild Enthusiasm. Only an Extraordinary Occasion will Make Britishers so Demonstrative. Without Question They Regarded the Arrival of Our Men in England as Worth the Finest Sort of a Demonstration

STUDENT OFFICERS PRACTICE WITH COLD STEEL

In the Hands of a Fearless Fighter the Bayonet Is Deadly. The Accompanying Pictures Illustrate Some of the Training Given Our Boys in Its Use. The Fellows Above are Coming "Over the Top"

Plunging through Barbed-Wire Entanglements in the Journey across "No Man's Land," Where the Attacking Force is Saved from Annihilation by the Barrage Fire of the Artillery

Below: Meeting the "Enemy" in a Hand-to-Hand Encounter, a Bloody Job That Demands Extreme Dexterity. The Boche has Lost Many a Trench Because of His Inherent Fear of Cold Steel

The Bundles of Brush Are "Enemy Snipers" That Occasionally Conceal Themselves in Shell Pits

Below: At the Objective Point on the Parapet of the German Trench: In the Bottom of the Excavation Are Sandbags Representing the Germans That are to be Dealt with Summarily

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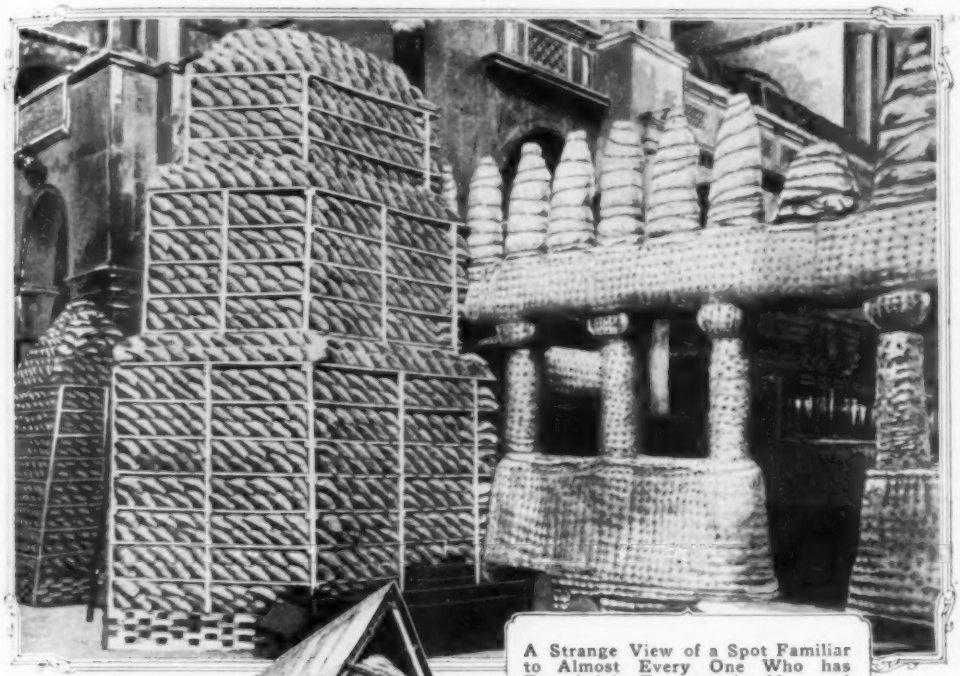
VENICE MASKS ART TREASURES TO SAVE THEM



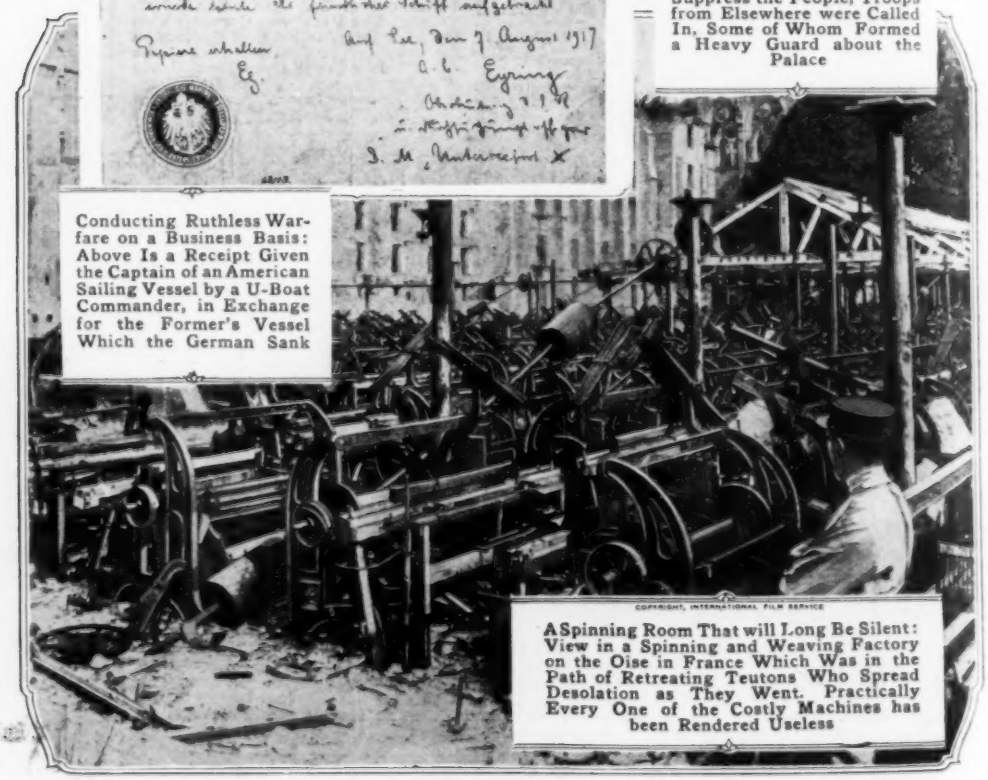
A Strange View of a Spot Familiar to Almost Every One Who has Traveled in Europe—the Altar and Sanctuary of St. Mark's Cathedral, Venice: The Venetians Consider This the Best Possible Form of Protection for the Revered Interior against the Air Raids of an Enemy Who Holds Nothing Sacred. These Coverings are Composed of Small Sandbags and Heavily Padded Quilting

While Many of the Towns and Cities of Italy have been Forced to Guard Their Treasured Specimens of Art and Architecture by Special Means, Venice, Close to the Enemy's Territory, has been Especially Subject to Attack from the Air. The Destruction Wrought in Some of Its Finest Churches has Produced Irreparable Loss. This View Shows One of the Principal Venetian Monuments Protected by Padding and Sandbags

BY-PRODUCTS OF WAR FOR NEUTRALS AND FOES

Soldiers Guarding the Royal Residence in Amsterdam against Hungry Rioters: The Food Shortage in Holland has been so Serious That There have been Many Disturbances in That Country's Principal City. Because Amsterdam Soldiers Refused to Suppress the People, Troops from Elsewhere were Called In, Some of Whom Formed a Heavy Guard about the Palace

Conducting Ruthless Warfare on a Business Basis: Above Is a Receipt Given the Captain of an American Sailing Vessel by a U-Boat Commander, in Exchange for the Former's Vessel Which the German Sank



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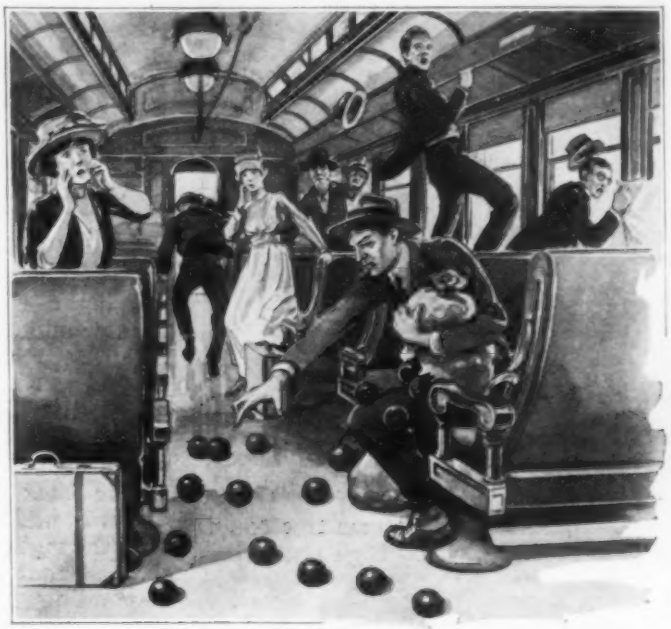
A Spinning Room That will Long Be Silent: View in a Spinning and Weaving Factory on the Oise in France Which Was in the Path of Retreating Teutons Who Spread Desolation as They Went. Practically Every One of the Costly Machines has been Rendered Useless

ACCIDENT IN CAR CAUSES PANIC AND PLOT RUMORS

With the nerves of almost everybody more or less on edge because of persistent though generally unfounded rumors concerning anarchists and pro-German fanatics, it was inevitable that panic should follow an accident that occurred recently on a train bound for one of the country's large training stations. Because of some carelessness in packing or handling, a bag carried by one of the passengers burst open and from it several objects, having every appearance of being bombs, rolled down onto the floor. In an instant the car was in an uproar and people were scrambling for safety. As a matter of fact, the objects were bombs, but they did not belong to an evil plotter as was rumored in towns along the line. Instead, they were being rushed to a training camp in response to an order.



Panic Followed the Bursting of a Bomb-Filled Package Carried by a Passenger on a Railway Train and Rumors of Anarchistic Plots were Spread

TRUCK MAKES ANY AUTO A FARM TRACTOR

A new steel truck which permits the use of any automobile for tractor purposes is of special interest because it requires no alteration in the car and leaves the latter available for ordinary driving at any time. The truck has four broad-tired wheels and supports two grooved tracks on which the automobile is driven with the aid of two grooved skids. The only extra parts needed for the car are small sprockets fastened to the flanges of the rear hubs and two castings attached to the rear axle. These need not be removed for ordinary driving. Chains connecting the sprockets with the truck gearing are quickly put in place, after which the car is raised up and rigidly held in position by two jacks provided beneath the rear axle. The truck's steering gear is mounted at one side, the steering wheel being fastened to an arm in front of the driver.

Steel Truck on Which Any Automobile can be Quickly Mounted and Used as a Farm Tractor: The Machine's Speed Is from Three to Five Miles per Hour

CHIMNEY BUILDERS' LIGHTS PRODUCE QUEER EFFECT

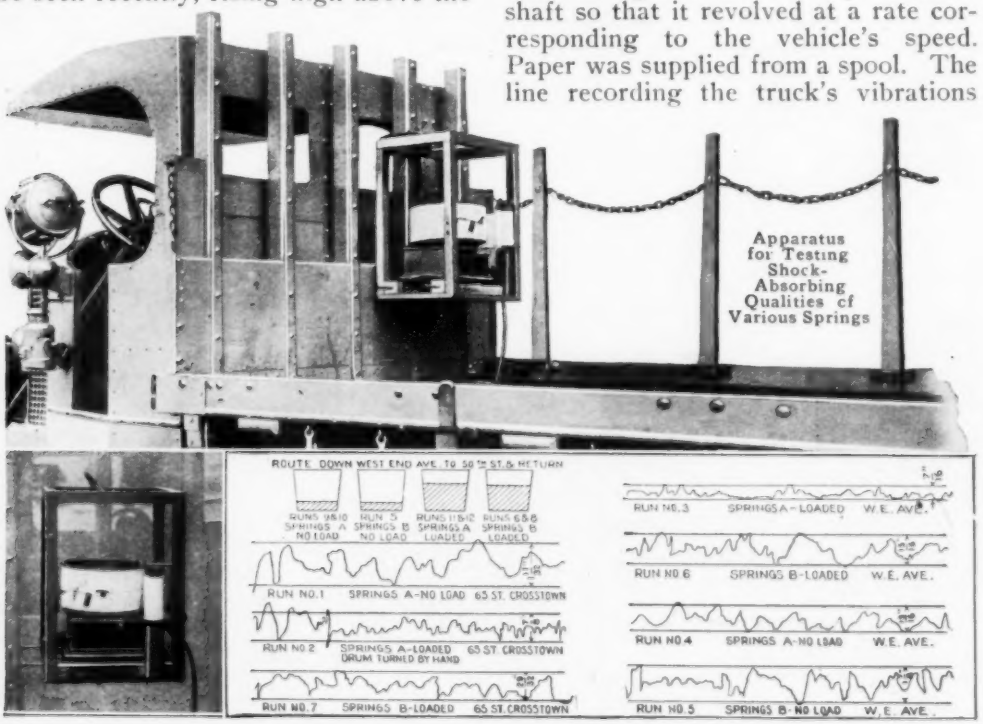
In one of Chicago's industrial sections what at a distance resembled a

Scores of Lights Hung above a Factory Chimney, Which Was in Process of Rapid Construction, Gave the Appearance of an Illuminated Christmas Tree

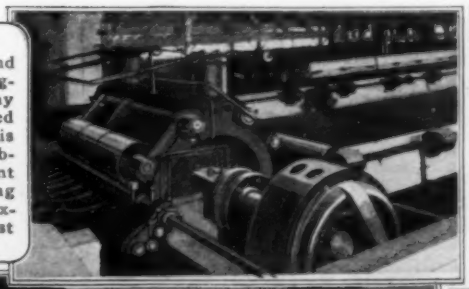
huge, illuminated Christmas tree could be seen recently, rising high above the surrounding roofs. A closer view revealed the fact that these lights were located above a concrete smokestack which was in process of construction. Because of the necessity of completing it in the shortest possible time, men were engaged on the chimney day and night, hence the unusual number of lamps which produced an effect suggestive of the holidays.

TEST AUTO-TRUCK SPRINGS WITH A SEISMOGRAPH

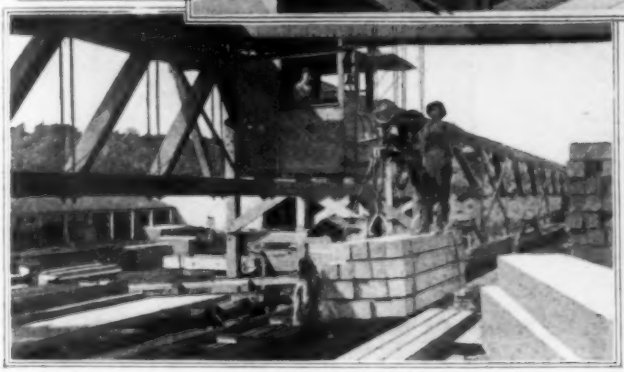
Records which showed in minute detail the extent to which springs of varying composition, but of the same size, would take up the vibrations of an auto truck, were recently made with a device constructed like a seismograph, the instrument used to record earthquake tremors. The apparatus was mounted in a framework attached to the back of the driver's seat. A drum, 12 in. in diameter, was connected with the right front wheel by a flexible shaft so that it revolved at a rate corresponding to the vehicle's speed. Paper was supplied from a spool. The line recording the truck's vibrations


Apparatus for Testing Shock-Absorbing Qualities of Various Springs
ROUTE DOWN WEST END AVE. TO 59TH ST. & RETURN
RUNS 9&10 SPRINGS A NO LOAD
RUN 5 SPRINGS B NO LOAD
RUNS 11&12 SPRINGS A LOADED
RUNS 6,7,8 SPRINGS B LOADED
RUN NO.1 SPRINGS A-NO LOAD 65 ST. CROSSTOWN
RUN NO.2 SPRINGS A-LOADED DRUM TURNED BY HAND 65 ST. CROSSTOWN
RUN NO.7 SPRINGS B-LOADED 65 ST. CROSSTOWN
RUN NO.3 SPRINGS A-LOADED W.E. AVE.
RUN NO.6 SPRINGS B-LOADED W.E. AVE.
RUN NO.4 SPRINGS A-NO LOAD W.E. AVE.
RUN NO.5 SPRINGS B-NO LOAD W.E. AVE.

Left: Close View of the Seismographic Device, Showing Recording Pencil Held by Weighted Spring. Right: Records of Various Trips Made over the Same Route with Different Springs



In the Foreground Is One of the Largest of the Many Motors Employed in Operating This Sawmill Which Obtains Its Current from an Adjoining Power Plant in Exchange for Sawdust



A Loading Crane in the Mill's Lumber Yard, Operated by Electricity: Where Power cannot be Delivered over a Wire, as in the Case of Trucks, Storage Batteries are Employed

One of the Largest Saws in a Mill Operated Entirely by Electricity except for a Few Steam-Driven Machines: This Saw Is 69 Feet Long and is Driven by a 350-Horsepower Electric Motor

was made on the paper, as it wound about the drum, by a pencil attached to the end of a weighted spring.

Seven test runs were made over the same route and at a constant speed of 15 miles per hour. Asphalt, cobblestones, and granite blocks were traversed, four of the trips being made with loads and three with the truck empty. The seismograph records showed a considerable difference in the shock-absorbing qualities of the various springs tested, indicating that, though a driver might not notice a difference, some types of springs cause much more wear than others.

MILL EXCHANGES SAWDUST FOR ELECTRICITY

What is pronounced an almost ideal arrangement in respect to fuel and power for two industrial plants is to be found in a large logging region in which a big sawmill is operated entirely by power derived from an adjoining electric plant, while the latter purchases its fuel in the form of sawdust and planer chips from the sawmill. The fuel is paid for on the basis of the amount of energy actually delivered from the switchboard, rather than the volume of combustible material received. This arrangement permits a considerable saving in operating certain of the generators. Fuel for the electric plant is stored in a huge stock house which holds the equivalent of 600 cords of wood. The generating capacity of the plant is 2,000 hp. The sawmill which receives electric power under this reciprocal arrangement has nearly 200 electric motors, ranging from a ¼-hp. motor that runs the planer-knife sharpeners, to the 350-hp. motor for the main saws. Monorail lumber carriers, timber loaders, and all saws are driven by motors, while in operating the log carriage, log turners, and in furnishing heat for the dry kilns, steam is used, which is also obtained from the electric plant. Storage-battery trucks are employed for hauling. The electric plant is one which serves over a dozen cities and towns, and has one line that is 40 miles long.

These Photographs, Showing a Point at the Headwaters of a Small Stream in the Lower Alps, Present an Example of Reforestation. The Picture at the Left was Taken in 1887 and That at the Right 20 Years Later

REFORESTATION UNDERTAKEN IN FRENCH MOUNTAINS

In connection with flood-control agitation, more or less attention is being drawn to the subject of reforestation. While this plan, according to some of our most authoritative engineers, is manifestly impracticable so far as its application to large streams like the Mississippi or Missouri rivers is concerned, in some cases it undoubtedly does have a certain value. In the mountain regions of France and Germany the scheme has been employed, and an interesting example is afforded near the headwaters of the Ubaye River in the Lower Alps. The work was commenced in 1887 when the mountain sides were entirely bare. Masonry barrages were constructed at frequent intervals to catch silt and check serious erosion. The mountains were then retimbered. Today, instead of being a bleak, barren waste as in former times, this district is covered with trees. Since the land in this instance has little agricultural value, the chief objection to reforestation cannot be raised. In all, according to the latest figures obtainable, France has retimbered 629,488 acres. But to reduce the height of flood waters at Memphis, Tenn., merely from the stage reached in 1912 to that of the next highest record, the reforestation of 566,000 square miles of the upper valley's most fertile land would be required, according to the president of the Mississippi River Commission.

MILLIONS OF BUTTONS FOR LIBERTY LOAN

A large manufacturing concern in the East has had a force of about 500 hands working day and night making liberty-loan buttons for the government. The last order was for 3,000,000 of the little celluloid buttons which one receives when he buys a liberty bond. The contract recently made with this company by the Secretary of the Treasury calls for the delivery of 100,000 buttons a day for 30 days. At the time of the first issue of bonds this company made an enormous supply of these buttons, which, however, now is exhausted so that the new order must be filled at once.

NEW ARMY CAMP PROTECTED BY SEASONED FIREMEN

In the big national-army camps provision is made for offensive and defensive fighting against the destructive forces of nature as well as against the enemy, fire stations being an important part of camp equipment. In Camp Custer at Battle Creek, Mich., the headquarters for the fire-fighting apparatus is a substantial wooden structure in which a telephone and suitable alarms have been installed, together with an up-to-date automobile fire engine. Very appropriately, the drafted men who have had previous service as firemen are the ones who are manning this station. The machine carrying the apparatus is a light, powerful touring car transformed into a chain-driven truck.

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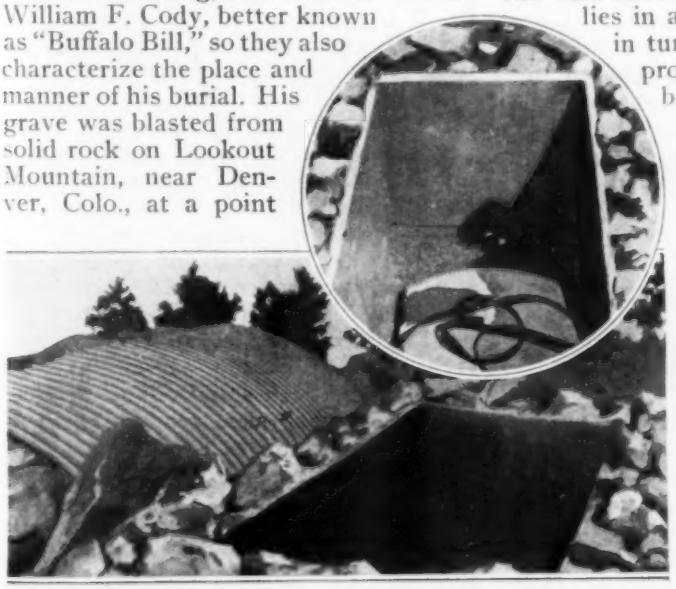
Fire Station and Up-to-Date Fire Truck at Camp Custer, Battle Creek, Michigan, Manned by Drafted Soldiers Who have Had Previous Experience as Fire Fighters

BUFFALO BILL'S CASKET INCASED IN CONCRETE

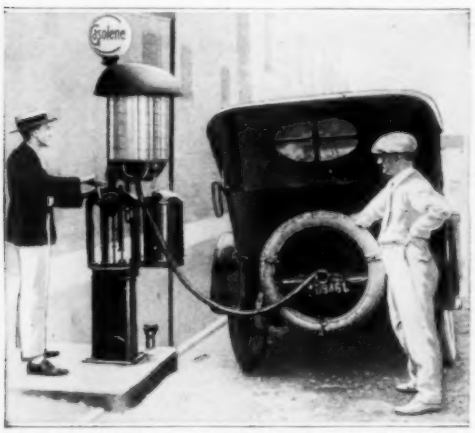
Just as the spectacular and unusual marked the long, adventurous life of William F. Cody, better known as "Buffalo Bill," so they also characterize the place and manner of his burial. His grave was blasted from solid rock on Lookout Mountain, near Denver, Colo., at a point which commands a wonderful view of the surrounding country. The body lies in a casket of bronze which in turn is sealed in a burglar-proof case. These two, on being set in place, were inclosed in concrete, the roof of this protection being formed with arched sheets of corrugated iron which were imbedded in the structure as the material was poured. It is over this lofty grave that a monument, depicted in a recent issue of this magazine, is to be erected to the great western scout and showman. It is believed that no one will attempt to molest the remains so exceptionally well protected by masonry and metal.



Buffalo Bill's Grave Blasted Out of Solid Rock: The Arched Sheets of Corrugated Iron Helped Form the Roof over the Burglar-Proof Case Which was Inclosed in Concrete

GASOLINE PUMP PROTECTION AGAINST SHORT MEASURE

For installation at public garages and service stations, a gasoline pump has



Gasoline is Measured in the Graduated Glass Containers Before It is Discharged into the Fuel Tank of a Motor Car

been developed which assures a motorist honest measure when he is purchasing fuel. Two 5-gal. glass containers that are air-tight and graduated, are supported at the top of the standard. The receptacles are supposed to be sealed by a local inspector of weights and measures. One of them discharges while the other is being filled, and a single lever controls both operations. A tube connecting the two cylinders equalizes the air pressure within them. If a patron takes the trouble of looking at the cylinders and determining their contents before any of the liquid has been allowed to flow to the car, he protects himself against dishonesty and the dealer against suspicion.

AMERICAN BUILDS POWERFUL AERONAUTICAL MOTOR

According to an official announcement made at Washington, American engineers, with the coöperation of the War Department, Bureau of Standards, and the aircraft production board, have developed an aerial motor that is equal to any that has been produced. It is now the main reliance of the United States in the quick construction of large fleets of battleplanes and speed scouts for service overseas.

In a highly dramatic account of the achievement, the secretary of war characterized the motor as a triumph of colossal importance. Since details of its design and performance are withheld for military reasons, the enthusiasm of Secretary Baker is the most tangible indication of the engine's merits that is available. In a signed statement he asserted, "In power, speed, serviceability, and minimum weight the new engine invites comparison with the best that the European war has produced. . . . . Probably the war has produced no greater single achievement. The new engine amounts practically to an international model. It embodies the best there is in American engineering and the best features of European models so far as it has been possible to adapt the latter to American manufacturing methods." These remarks were made, no doubt, with full cognizance of the remarkable strides made of late by Italian engineers which have given to Italy, it is declared, present mastery of the air.

Two engineers of international reputation were locked in a suite of rooms in a Washington hotel where they worked day and night until drawings were completed for the new motor. In this connection Secretary Baker says: "A remarkable American engine was actually produced three weeks before any model could have been brought from Europe." Since then it has been constructed and put through a series of severe tests which have proved its superiority to the complete satisfaction of its builders and the government.

The outstanding feature of the motor is its standardization. Every part of the unit has been standardized so that rapid and economical production by a great many factories is feasible. This also makes it possible to build the engine in four different models ranging from four to 12 cylinders, each using identical parts. Repairs at the front, therefore, can be made readily and new engines even assembled from parts of wrecked ones.

WOMEN AT NEW TASKS IN WORLD'S WORK

A Splendid Physique and Expertness as a Swimmer have Brought Miss Dora June Wheeler, Aged 19, of Hollis, Long Island, Unusual Distinction, for She has been Appointed Instructor in Swimming in the Federal Life-Saving Corps. She Won Special Praise Some Time Ago by Rescuing a Drowning Man. The Young Woman Is Shown in Her Surf Boat

The Picture on the Left Is of Miss Edna Flynn of Seattle, Who was "Discovered" by a High Railroad Official in a Small Town and Made an Expert in Selling Railroad Tickets to Women. Now She is Engaged in Training a Large Staff of Young Women to do Similar Work for the Southern Pacific System

This Young Lady Is the Bodyguard of a Woman Investigator Who Aroused Bitter Personal Enmity by Her Exposure of New York's Vice Conditions. The Fair Protector Wears the Women's Defense League Uniform

Dangling Six Stories above Fifth Avenue, New York, on an Unsteady Painter's Scaffold Is Not a Comfortable Sensation, but Miss Lucile Patterson, a Young Artist, Endured It Recently to Paint a Patriotic Poster on a 20-Foot Billboard for the National League for Woman's Service

TROPHIES OF AIRMAN TELL GRIM STORY

Through the almost impenetrable barrier which the war has raised between the central powers and the rest

COURTESY THE AEROPLANE, LONDON

View of the Sitting Room of the German Flier, Captain von Richthofen, Showing Several Number Plates on the Walls from Aeroplanes He has Brought Down. This Airman Won Fame as the Leader of the So-Called "Flying Circus"

of the world there filters now and then a photograph which gives an intimate glimpse of the life or personal surroundings of the enemy. Such is the unusual picture reproduced herewith, showing the sitting room of the famous German airman, Captain von Richthofen, at the headquarters maintained by him and his comrades. This group of men, because of their extraordinary daring and spectacular maneuvering in Gotha aeroplanes, has been nicknamed "the circus." On the walls of the room are to be seen several aeroplane number plates, presumably from machines which the captain brought down. Hanging from the ceiling is a chandelier made from a Gnome engine. According to recent reports Captain von Richthofen has been killed.

RESCUE HELPLESS COLONY ABANDONED IN PACIFIC

To the usually prosaic reports on file in the Navy Department has been added a dramatic account that rivals "Robinson Crusoe" and "Swiss Family Robinson." It is written by the commander of an American warship which recently visited Clipperton Island, a desolate speck of land some 600 miles southwest of southern Mexico. Here our sailors rescued 11 persons—a refined young Mexican woman, her four children ranging in age from two to eight, the woman's servant, another mother and child, and three children whose parents had perished. This forlorn group had been cut off from the world since 1914 and were all that remained of a colony of over 30 Mexicans. The men in the colony had been representatives of the Mexican government or employes of a company that had shipped guano from the island. The mother of the four came to this forsaken spot as a bride in 1908. Until 1914 the group had occasional communication with the mainland, but what proved to be the last supply ship visited the island early in that year.

Shortly after, an American schooner was wrecked on the shore and in June, 1914, the U. S. S. "Cleveland" came and took away the surviving members of the schooner's crew. At that time there was no apprehension of disaster. But no more supply boats came and provisions grew less and less until, in 1915, the man who had brought his bride to the island set out in an open boat with three companions to obtain help. They were never heard from again. Scurvy increased alarmingly and steadily lessened the size of the colony until it was so small that the supply of cocoanuts—averaging about one a week for the entire group—was sufficient to check the disease. Flesh and eggs of birds, a few chickens and fish, constituted the other food.

No words can describe the scenes upon the arrival of the rescue party nor the return, some time later, of the poor women and children to Mexico.

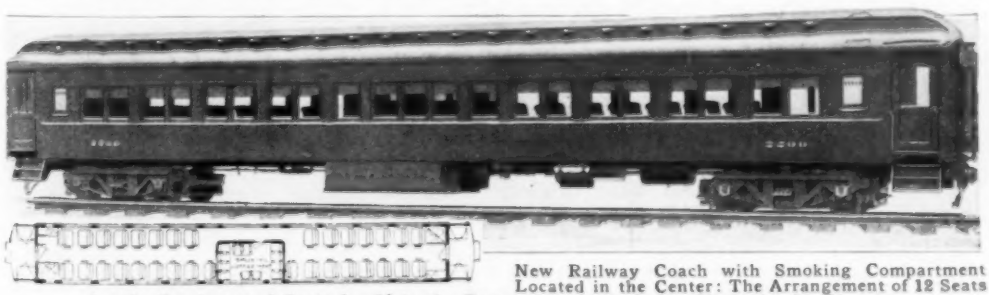
LONG FOOTBRIDGE TO A COUNTRY CLUB

Suspension Bridge, 550 Feet Long and Four and One-Half Feet Wide, Leading to Tyngs Island in the Merrimac River: Access is Gained to It by Passing through a Coin-Operated Turnstile

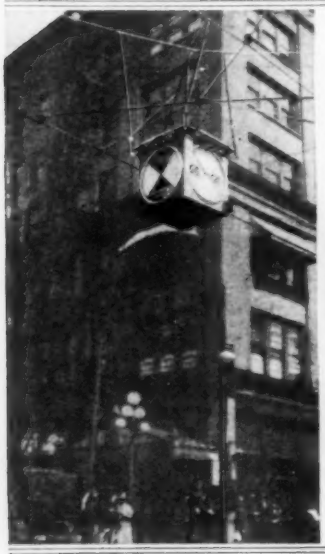
A suspension footbridge, said to be the longest bridge of its width in the world, connects a country club on Tyngs Island, in the Merrimac River, about 7½ miles from Lowell, Mass., with the mainland. It is 550 ft. long and 4½ ft. wide, and is supported by heavy wire cables anchored to a trestle at each end. The floor of the bridge is smoothly planked crosswise and there are substantial handrails on either side. Entrance to the bridge from the mainland is gained through an automatic turnstile, which opens to permit passengers to pass through upon the dropping of a nickel in a slot.

SMOKING ROOM IN CENTER OF NEW RAILWAY CAR

A departure from the conventional type of coach is found in a steel passenger car built for the Erie Railroad, which has the smoking compartment in the center instead of at one end of the conveyance. This room is furnished with 10 stationary seats and two wicker chairs, all upholstered in leather. An aisle running at one side of the smokers' inclosure connects the main sections each of which has a seating capacity for 32 passengers.



New Railway Coach with Smoking Compartment Located in the Center: The Arrangement of 12 Seats for the Smokers and Seats for 64 in the Remainder of the Car is Shown in the Diagram



No Corner Semaphores are Used with This Signal, Which is Operated by Turning an Electric Switch

A Central Traffic Signal Which is Supplemented by Semaphores at the Street Corners

The Seated Officer Controls the Signal and Arrow Shown and Also a Signal over the Center of the Street

NEW SUCTION BROOM SWEEPS WITHOUT RAISING DUST

By adapting the principles of three familiar household implements—the common broom, the carpet sweeper, and the vacuum cleaner—a new dirt-collecting contrivance, a suction brush, has been devised as a labor saver. The apparatus is used in much the same manner as an ordinary broom. It is provided with a long, flexible handle which operates strong bellows that produce an effective suction force. A small flat brush at the "nozzle" end combs the nap of a rug and loosens dust, a revolving brush picks up thread and surface litter, and the inrushing air carries the dust into a bag. Its operation is purely manual; electric current is not employed. With this device floors may be swept satisfactorily without filling a room with dust. The device weighs three and a half pounds and is carried on silent rubber wheels.

ELECTRIC STREET SIGNALS FOR TRAFFIC OFFICERS

It is now being generally recognized that efficient traffic regulation effects a great financial saving to the business interests of a city, and for this reason, the authorities in one of the country's growing municipalities have installed at certain street crossings especially designed electric signals. Over these intersections are hung cube-shaped signals in the sides of which are dials whose faces can be changed to read "Go" or "Stop" by operating a switch at one of the corners. With each change of the signal a bell rings and red and white lights show at the proper sides. Supplementing this central signal, and operated in conjunction with it by the policeman in charge, are signals at each corner. These consist of semaphores reading "Go" and "Stop," together with an arrow that points in the direction traffic is permitted to travel. A red or white light is displayed in accordance with the signal given and a bell is rung when the change is made. At less congested crossings there are only central electric signals in which the words "Go" and "Stop" are alternated.

HOGS SOLVE THE GARBAGE PROBLEM FOR DENVER

UTILIZATION of waste food has become a problem of first importance now that America is depended upon to feed her allies' armies. For this reason the system of garbage disposal successfully followed in Denver for the last ten years is of timely interest, for there the garbage is converted into marketable pork without public expense.

The prevailing system of garbage disposal in American cities is that of incineration. This puts a burden upon the taxpayer or home owner, according to the system of cost distribution, and at the same time results in an economic waste. The reports of health departments in a majority of American cities prove that garbage disposal is regarded as an unsolved problem. In such cities, garbage is a nuisance, while in Denver it is the basis of a new public-utility corporation.

The city of Denver, with its 250,000 inhabitants, has paid nothing for the collection and disposal of its garbage for ten years, neither as a municipality, nor as individual citizens. The garbage question there is the least troublesome of all the health-department problems. The hog-ranch company, which takes the garbage, even handles complaints.

The contract between the city and the hog-ranch corporation runs in four-year periods. For a consideration, $1, the Denver hog ranch is given the privilege of hauling away the city's garbage. The company's equipment for this work consists of 35 steel tank wagons, each of 600-gal. capacity. Daily collections are made in the business district, twice a week in the residence districts in winter and every other day in summer.

A Denver Garbage Can and Ash Pit

Complaints received at the city hall are turned over to an employe of the hog ranch. He answers them immediately, using an automobile on the rear end of which a garbage can is carried to take care of emergency cases. City ordinances require every home owner to provide a covered, galvanized-iron garbage can; to keep this can clean; to throw into it only edible garbage. A garbage collector who finds paper, glass, or other foreign substances in the cans reports the matter to city authorities and the resident is compelled to dispose of this garbage himself.

Ingenious Nonfreezing Water Container and Pigs Just Starting on Their Journey through the Fattening Pens

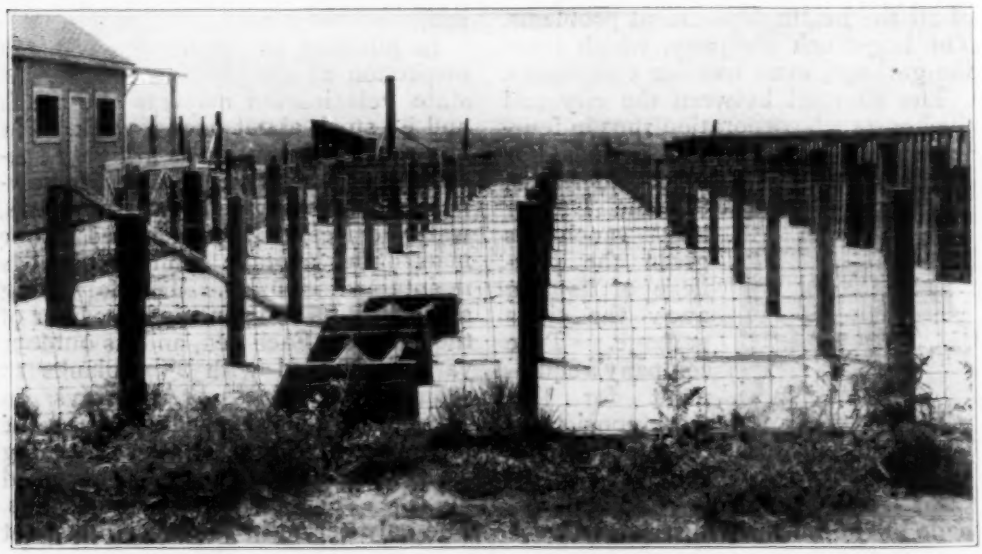
In addition to regular government inspection at the packing houses, the state veterinarian inspects the ranch and its stock about once a week. The hog-ranch corporation is a highly specialized organization. Stables, farrowing shed, breeding pens, fattening pens, water devices, are all supervised by one man. The average number of hogs maintained is 5,000. The farrowing shed, with its 500 pens, is the center of the system. Each pen, and its outdoor yard, is floored with 2-in. planks to promote cleanliness. Alleyways on either side of the shed separate the farrowing yards from the fattening yards. A third yard system is occupied by the sows with weanling pigs. The only period in the hog's life spent upon concrete is in the weaning yards, as hard floors annoy the animals.

As soon as they will eat, the young pigs have garbage fed them, and this continues to be the basis of their diet until they reach the market size. When introduced in the weaning yards, where they remain until eight or ten weeks old, the young pigs have alfalfa added to their diet, for a straight garbage diet does not produce as valuable pork as does a balanced ration. Two and one-half tons of alfalfa, fed green in summer, is thrown in the racks every other day. The ranch has 1,300 acres of alfalfa field under lease, from which an ample supply is derived.

Immunizing a 10-Weeks-Old Pig with a Double Injection of Virus and Serum: The Veterinarian Is Very Careful Never to Touch the Animals He is Treating

When weaned the young pigs are immunized for life from hog cholera. A veterinarian injects cholera virus and cholera serum at the same time. Following this treatment the pigs go into the fattening pens, being graded and regraded once or twice a month, and promoted according to weight. Shoats, upon reaching a weight of 150 lb., are sent to the finishing pens, where corn is added to their diet. Attendants select brood stock at this time, and these animals never receive corn, as they must be kept thin.

A number of specially adapted feeding devices are used on the ranch. Slatted alfalfa racks prevent waste of this food. Corn is fed whole in self-regulated hoppers, an adjustable baseboard at the foot controlling the flow of grain into the trough. In the fattening yards garbage is fed on a concrete slab, 8 ft. wide and 6 in. above the ground. The slab is fenced on either side and divided by gates into sections the width



Weaning Yards Ready for Sows and Litters: The Area is Paved with Concrete to Promote Cleanliness among the Young Pigs. In the Sheds Wooden Floors are Preferred, as Concrete Makes the Animals Restless

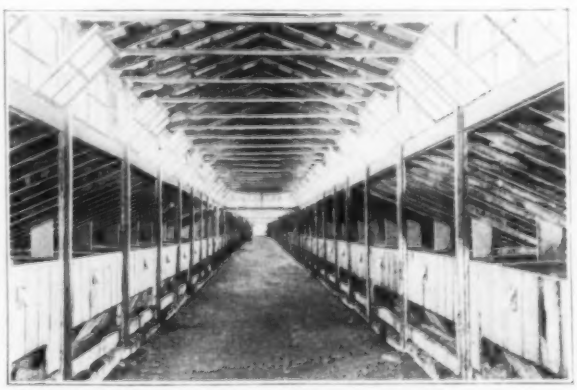
Fat Hogs Ready for Market, Eating Corn from One of the Self-Feeding Hoppers: At This Stage the Animals Receive Garbage at a Certain Hour Daily, and Alfalfa and Corn as They Wish It

of the yards. The garbage wagon, as it comes from the city, is driven down the alleys and the garbage is shoveled upon the slabs, or floors, of the farrowing or weaning yards, as the case may be. Gates from the fattening yards admit the hogs to the slab. A hog being fattened will not clean up all garbage given him. This service is performed by a special herd of lean scavenger hogs that receive only the food they pick up from the slabs and alleyways. Men with shovels follow the scavengers, and the slabs are washed at regular intervals.

The most ingenious device upon the ranch is the water tank. It consists of a concrete base having a 2-ft. well in the center. Above this rises a galvanized-iron hood with conical top. Two 10-in. recesses permit hogs to insert their snouts, but prevent fouling of the water. Water rises from below through a pipe, the flow being regulated by a ball cock. A slide on one side of the hood may be raised, giving entrance to the lamp chamber below ground. Freezing in winter is prevented by the lamp.

In response to popular agitation two years ago, the hog-ranch company installed a complete sterilization plant at a cost of $15,000. Its use has been abandoned on the ground that the acetic acid formed by cooking stimulates the hog's stomach for the first two months, and then attacks and ruins his digestive organs.

Until the present year, when the antiwaste campaign instigated by the world war resulted in a 33-per-cent reduction in garbage supply, the average annual yield was 22,000 tons. The ranch pays drivers $10 a month, and



The Farrowing Shed Containing 500 Pens: The Tablet Attached to the Front of Each Inclosure Bears Data Concerning the Size and Age of the Litter Within

estimates their board and room at $20 per month each, making a total collection cost of about $25,000 a year, exclusive of horse feed and interest on the investment in collection equipment. Seventy-five horses are used.

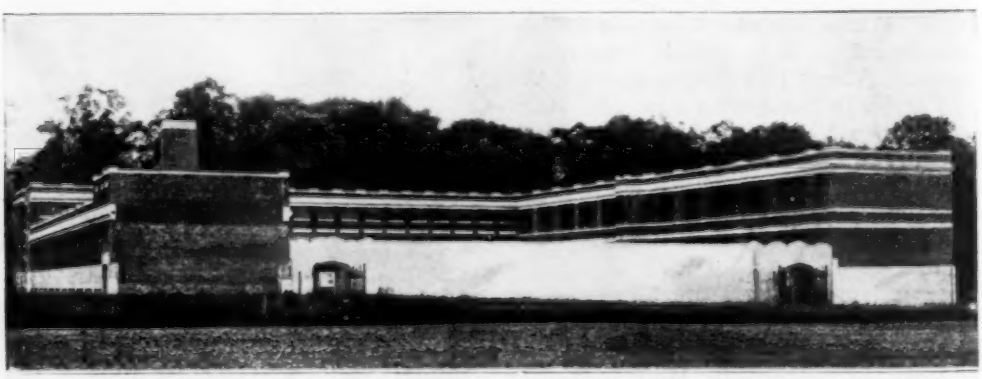
A Typical Litter in One of the Farrowing Pens Which is Floored with Plank: The Percentage of Survivals in Each Litter Is Large

The company started six years ago to immunize all its hogs, and this resulted in the development of a side line that is now one of the most profitable elements of the business. A laboratory of 20 rooms, with pens for 500 hogs, has been built, where cholera virus and serum are manufactured for commercial use. Half a dozen veterinarians are employed here and the product sold generally throughout the West and Middle West. Immunized brood stock, guaranteed for life, also is sold, while the company has acquired and stocked from the mother ranch, two ranches in northern Colorado, where alfalfa is the basic food. About 150 tons of fertilizer, made from the bones found in the garbage or taken from hogs that have been used in the manufacture of virus and serum, are sold every year.

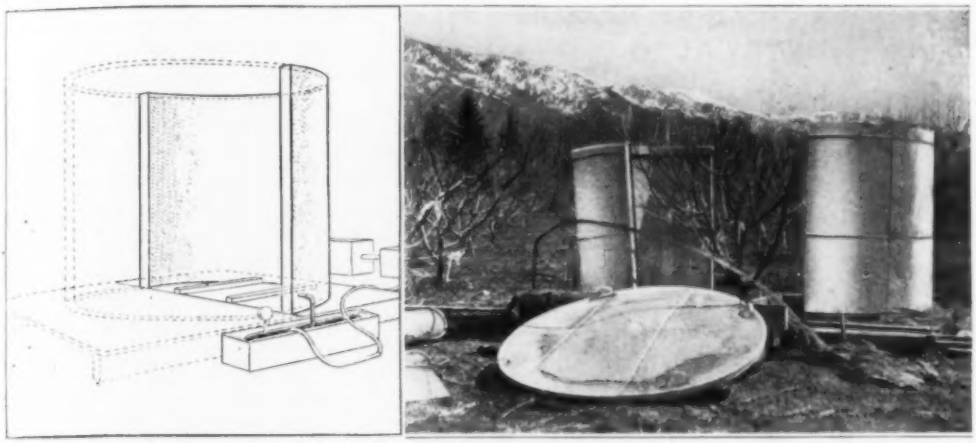
NEW ASYLUM CONSIDERED ESCAPE-PROOF

The most advanced ideas in the construction of detention buildings are to be found in a recently completed state hospital for the criminally insane which is believed to be escape-proof. The structure is of brick, reinforced concrete, and steel, and is built in the form of a "U," the main portion being three stories high and the wings two stories. A high wall connects the two wings so that the courtyard is entirely inclosed. There are but two entrances to the building, both locking from the inside. The windows are guarded with flat steel bars. Long hallways run past the individual cells, each of which has a large glass door protected by steel bars permitting a passing guard to inspect the interior. A second door leads to the courtyard where the patients exercise. The building cost $160,000 approximately.

¶The woman's committee of the Council of National Defense has organized a news-collection bureau which will engage in gathering material of heroic, romantic, and economic nature concerning women in war.



Recently Completed State Institution for the Criminally Insane Which will Accommodate 200 Patients and Which by Reason of Its Special Construction is Considered Escape-Proof



Apparatus for Freezing Whole Fruit Trees to Determine the Damage Which Various Temperatures Produce: The Two Halves of the Cylinder are Set Close about the Tree and Then Cold Air is Forced into the Inclosure

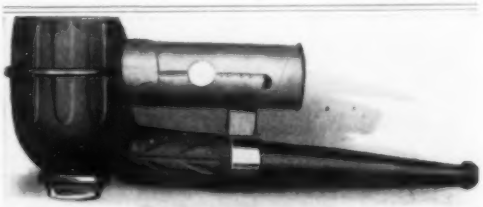
OUTFIT FREEZES TREES SCIENTIFICALLY

Investigators at the Utah Agricultural Experiment Station have devised means for freezing fruit trees scientifically to ascertain the amount of injury to fruit which may be caused by frost and a range of critical temperatures. The principal part of the outfit built for this purpose is a double-walled cylinder of galvanized iron, 6 ft. in diameter and 6 ft. high. It is made in two parts, each mounted on a platform so that it can be moved about and fitted around a tree. In the 4-in. space between the outer and inner wall and on top of a cover, ice and salt are placed, after which the whole is covered with canvas. By means of a pump connected with an inlet in the cylinder's side, cold air is forced into the inclosure from a tank surrounded by salt and ice. An electric fan in the cylinder keeps the air in circulation. Projecting thermometers indicate the approximate temperatures of the air within. Hanging from the tree at various heights are registering thermometers which show the lowest point to which the mercury drops, while a thermograph traces the temperature changes.

With this apparatus a temperature as low as 12° F. has been obtained. The cost of operating is about $10 per 10,000 buds. Valuable data for fruit growers have been obtained by counting the damaged buds and later noting damaged fruit on trees that had been frozen. This process, while for a different purpose, suggests the practice of packing ice about tree roots to retard budding, as described in Popular Mechanics Magazine for April of last year.

MAGAZINE SUPPLIES PIPE WITH SMOKING TOBACCO

To obviate the need of continually refilling his pipe, a smoker has designed a tobacco magazine that feeds the bowl as the content of the latter is consumed. It consists of a metal cylinder supplied with a coil spring and is mounted horizontally above the stem. One end is fitted into a hole bored through the bowl. When continuous



A Spring Inside of the Cylinder Forces Tobacco into the Bowl of the Pipe

feeding is not desired, the spring can be locked and the supply of tobacco in the magazine held in reserve.

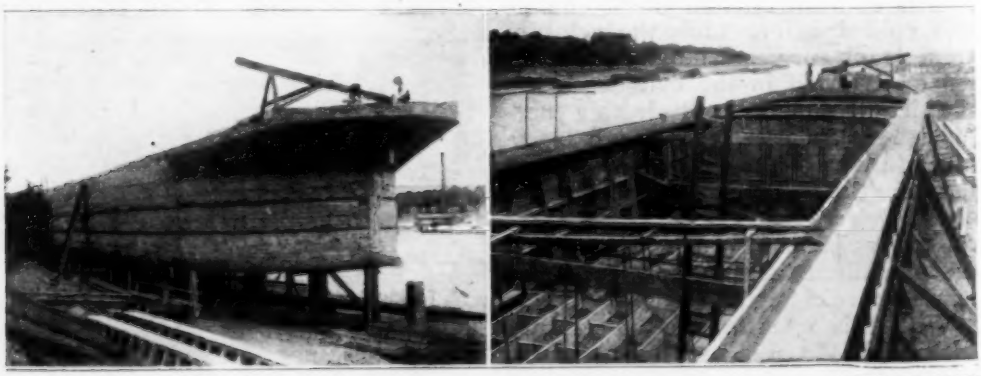
FENDER PICKS UP PERSON HIT BY AUTO

Recognizing the fact that the injuries of many persons hit by automobiles are made more serious by reason of the fact that the cars which hit them pass over their bodies, an inventor has recently patented a fender that cushions the blow which a car may give to a pedestrian and at the same time picks him up and carries him along until the vehicle can be stopped. The fender consists of a horizontal platform of meshed wire located in front of the radiator between the mud guards. The latter extend straight downward a short distance after curving above the wheels and thus permit the fender to be hung quite close to the ground. The wire-mesh platform is not attached directly to the mud guards, however, but to a buffer which is bolted to them. Between the buffer and the fender are several coil springs which help to cushion any blow the car may give.

Automobile with Fender Designed to Pick Up a Person Who has been Accidentally Struck, Thereby Preventing His being Run Over

FRANCE BUILDS CONCRETE BOATS TO SAVE TIMBER

Regarding the use of concrete in the construction of vessels, much has been said and a little accomplished in this country during the past few years. It is interesting, therefore, to observe that in France considerable progress is being made in this direction. In order to reduce the consumption and importation of timber, large barges and canal boats are being built of reinforced concrete. Although it is not known how generally the practice has been adopted, the venture is not merely an experimental one. The merits of such vessels are known. They are fireproof, can be constructed quickly by unskilled laborers, have low maintenance cost, will withstand hard usage, will not rust or rot, and are as easily towed and handled as wooden craft. Reinforced-concrete construction is supposed to have first been employed in the building of small boats. A Frenchman in 1849 built and patented a concrete rowboat.



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Stern View of One of the Big Concrete Barges after the Partial Removal of the Outside Forms; Right: The Interior of a Boat Nearing Completion with Forms in Place

A Testing Hole between Two Rows of Cars: One Advantage of This Outfit Was That It could be Used in a Switchyard Where Cars were being Moved Frequently

Ascertaining the Depth of a Railroad-Yard Fill: The Weight of the Two Men Gradually Forces the Casing Down into the Hole Made by the Sand Bucket. The Auger Lying on the Rails is Used to Penetrate Clay

SOUNDING OUTFIT REVEALS DEPTH OF RAILWAY FILL

Accurate estimates of the depth of railway fills are among the important items which the government's employes are required to obtain in the enormous task of making a physical valuation of the country's railroads. The problem is not as easy as it might appear at first, for in the course of years the weight of a fill in many cases has caused it to settle down into the soil, and as a result calculations based on surrounding natural levels are unreliable. To meet the demands of the situation, a simple outfit has been employed by certain of the engineers, consisting of a sand bucket which is inserted into a casing composed of 4-ft. lengths of 4-in. pipe, screwed together as needed. Two blocks are bolted about the upper end of this casing, which serve as supports on which two men stand after the lower end has been inserted in the soil. By operating the sand bucket inside the pipe the men's weight gradually forces the casing down into the earth until the material brought up shows that the bottom of the fill has been reached.

PHOTOGRAPH-PRINT DRIER WORKS EFFICIENTLY

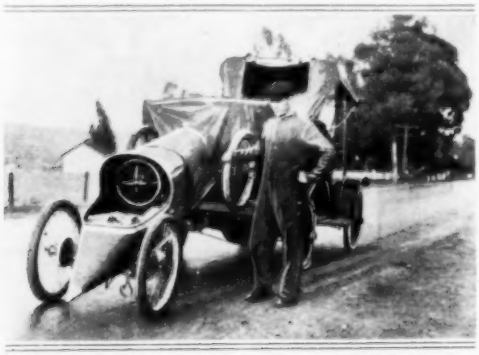
For drying large numbers of prints, a commercial photographer has devised an apparatus that operates very satisfactorily. A wooden frame mounts a big galvanized-iron drum and a number of small rollers, about which two continuous canvas belts are so stretched that they are held tightly in contact. The cylinder is motor-driven and makes one revolution in three min-

While the Prints are Carried around the Cylinder between the Two Canvas Belts, They are Subjected to the Heat and Dried

utes. The prints are placed between the canvas strips at the top and discharged into a hopper at the front of the machine as they complete the circuit. Inside of the drum is a gas burner. The heat keeps the fabric dry and warm.

LONE MOTORIST TAKES TWO CARS ON TRIP

A motorist whose duty it was to drive a well-loaded motor truck a distance of 40 miles recently was some-

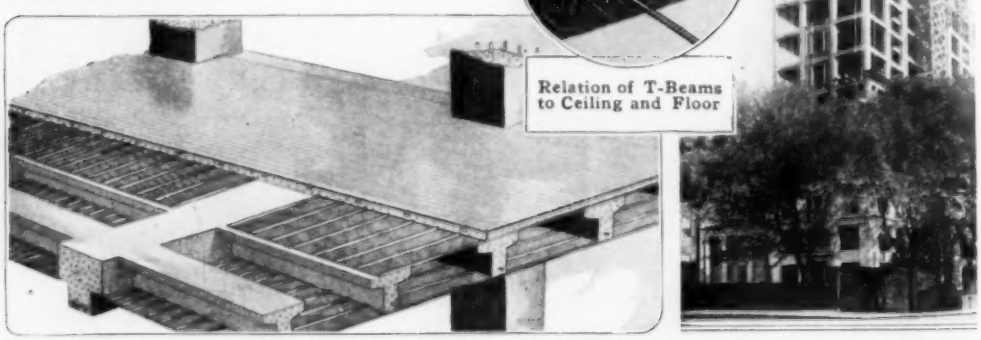


By Tying the Front Wheels of the Racing Car on the End Gate of the Loaded Truck This Motorist Was Able, Single-Handed, to Transport Both Machines a Distance of 40 Miles

what puzzled as to how he should carry a racing car which he had to take with him on the same trip. There was no room to load it on the larger car, and towing it in the ordinary fashion was out of the question, as there was no one to steer the smaller machine. The problem was overcome by raising up the front end and tying it to the end gate of the truck.

LAY REINFORCED CONCRETE AT REDUCED COST

In erecting the new 12-story office building for the Federal Trade Commission in Washington, D. C., methods were employed which resulted in a great saving of both material and time, the contractors being able to pour a floor once in every five working days. The supporting woodwork was put up in the usual manner and all the metal lath for a ceiling was laid directly on the wooden forms and tied. Above the lath the reinforcing bars for T-shaped beams were placed so that the beams' centers would be 28 in. apart. Special metal molds for these beams were next installed. When the concrete was poured in them the metal lath below was imbedded in it and so held permanently in place. The steel forms were then removed upward, obviating the usual necessity of delaying the work until the beams had set sufficiently to support their weight and that of the men. After pipes, wires, etc., were installed, sheets of metal lath were laid immediately above the beams. These were covered with a 3-in. cinder-and-concrete floor. This form of construction results in a great saving of dead floor weight and saves much material.

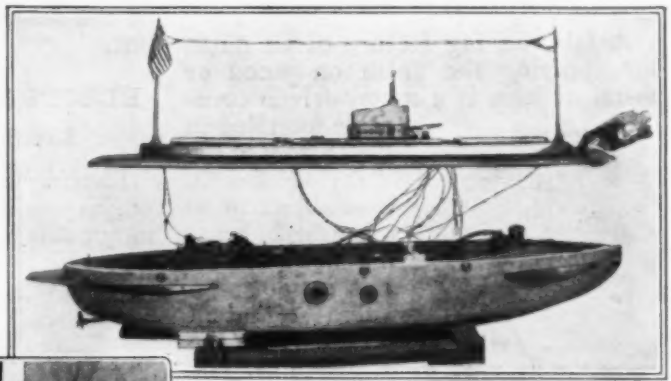


Relation of T-Beams to Ceiling and Floor

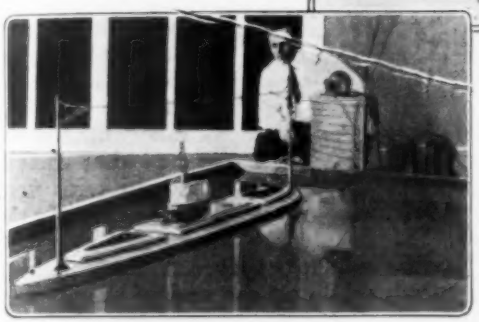
Left: Section of Partly Completed Floor. The Metal Lath are Imbedded in Under Face of T-Beams.
Right: General View of 12-Story Concrete Office Building in Process of Construction.
The T-Beams in the Floors can be Seen in Several Places

WIRELESS DIRECTS MODEL SUBMARINE

Because of its timeliness and good behavior, a radio-controlled submarine of recent development is commanding attention. The principle of governing vessels from land or air by means of wireless apparatus has evoked widespread comment during late years and its application to fighting machines is, of course, its most important and at this time, most interesting phase. Some weeks ago an 800-lb. model submersible was launched in a large tank of water and navigated before an attentive crowd of spectators. It performed to the satisfaction of its inventor, who regulated its movements by operating controlling keys that caused radio waves to be sent out, which in turn were picked up by antennae carried by the small craft. The vessel responded promptly at the touch of a key, proceeding forward, turning, reversing, submerging, or firing a torpedo, at the will of the inventor. Its builder suggests that a few 50-ft. submarines of this type, loaded with explosives so as to serve as enormous navigable mines, might prove effective weapons for dislodging the German navy from its place of safety in the Kiel Canal.



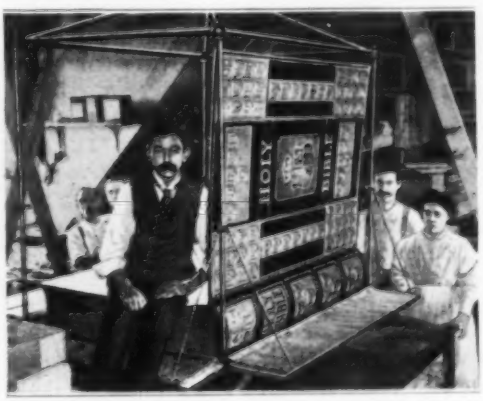
Showing the Mechanism Installed inside the Submersible, the Character of the Fins and the Elevator: The Hand Holds the Tiny Torpedo That is Fired



Eight-Hundred-Pound Model Submarine Navigating under Radio Control: The Vessel Responds Instantly to the Whims of Its Inventor

THOUSANDS HELP TO MAKE BIG MANUSCRIPT BIBLE

A massive Bible, in the making of which 12,000 persons shared, has recently been completed as a feature of a great Bible campaign that has been instituted in England. The volume is in manuscript form and the thousands of workers who helped make it did so by writing out various passages. The tome measures 6 ft. 2 in. long and 3 ft. 10 in. wide, and when opened is 7 ft. 10 in. across. Seven goat skins were used in fashioning the heavy cover which is richly embellished with coats of arms.



Bible Recently Completed in England Which Is in Manuscript Form and was Written by 12,000 Persons

MOTOR-DRIVEN TURNTABLE IN SPRAYING BOOTH

A labor-saving feature of an outfit for spraying the finish on wood or metal articles is a motor-driven turntable installed in the bottom of the spraying booth. The object to be varnished, having been set on this support, revolves so that all sides can be coated alike. The turntable is driven by a ⅛-hp. motor and its speed can be regulated by means of a friction wheel and disk. A hand lever controls the raising and lowering of the table through a range of 10 in., and it can be stopped with either a hand lever or a pedal, without stopping the motor.

NEW FLOWERPOT SERVES AS FERTILIZER

A type of flowerpot, which disintegrates and fertilizes the plants contained in it when the latter are placed in a garden, has been patented recently. These new containers are made of clay reinforced with straw or jute, the clay being mixed with some suitable fertilizer. This material is molded under pressure and then sun or kiln-dried, but not burned. The pots are filled with earth and used in the ordinary way until the plants they contain are ready to be set out. Then, instead of removing the small plants from their container, they are set in the ground, pot and all. Within a short time the holder disintegrates, fertilizing the roots which gradually penetrate it. Such a method of transplanting obviates disturbing the roots of the flowers or vegetables being set out.

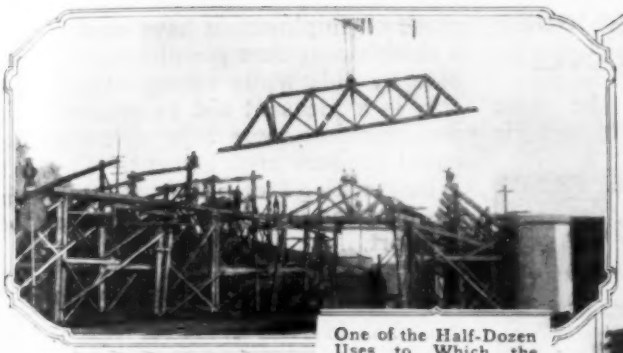
ELECTRIC RAZOR OPERATES LIKE TINY CLIPPERS

Shaving by electric power has been made possible by the invention of a motor-driven razor which operates somewhat like a pair of clippers. The instrument is provided with two blades mounted side by side which resemble safety-razor blades except that each is edged with very fine teeth. In the handle is a tiny motor which revolves a shaft at high speed, while on the end of the shaft is a cam that causes one of the blades to oscillate rapidly. The shearing motion produced in this way cuts the hair off close to the skin with little effort on the part of the user of the razor.

COMBINED WEATHER VANE AND DRAFT REGULATOR

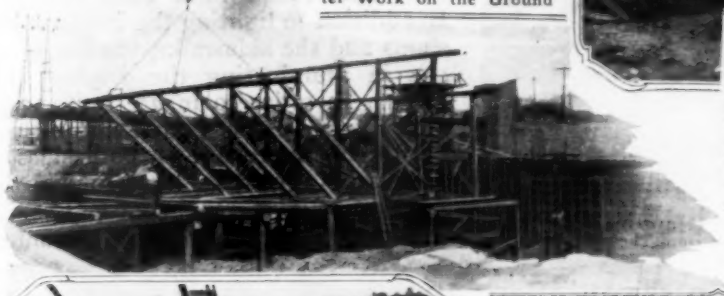
The ornamental metal crow which stands on top of the chimney shown in the accompanying illustration serves both as a weather vane and as a draft regulator. It is mounted on a pivoted base and swings about, keeping its back to the wind. A piece of sheet metal which extends downward from the chimney cover and swings with it, is so situated with reference to the bird that it is always on the windward side, thereby sheltering the flue from down drafts.

MANY USES FOR CABLEWAY IN BUILDING BRIDGE

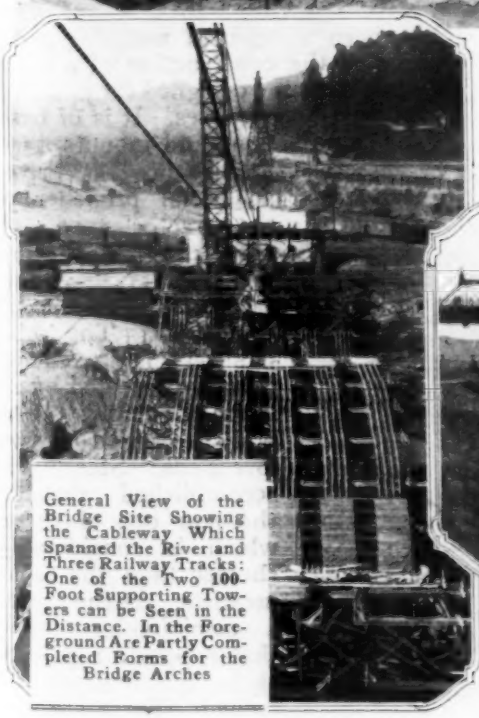


One of the Half-Dozen Uses to Which the Aerial Tramway was Put in the Construction of a Reinforced-Concrete Bridge: Carrying the Forms for the Concrete to the Bridge Carpenters, as Shown Here; This Arrangement Permitted the Men to Do a Large Part of the Carpenter Work on the Ground

Another Use for the Overhead Cable: This View Shows One of the Hoppers, Together with Its Frame Supports, being Transferred to a New Site. These Hoppers were Used in Filling Foundation Holes with Suitable Material



The Picture Above Shows a Frame being Raised into Position. In Some Cases After Frames have been Completed in a Horizontal Position Many Men are Required to Set Them Up, but Here the Work was Quickly Done by Utilizing the Aerial Tramway



General View of the Bridge Site Showing the Cableway Which Spanned the River and Three Railway Tracks: One of the Two 100-Foot Supporting Towers can be Seen in the Distance. In the Foreground Are Partly Completed Forms for the Bridge Arches

Excavating for the Foundations: Much Labor was Saved in Transferring the Dirt from the Excavations to Various Fills by Using an Orange-Peel Bucket Which was Suspended from the Aerial Cableway

SPECIAL SEAT IS DESIGNED FOR TWO-PASSENGER CYCLE

Two workmen who use the same motorcycle in going to and from their place of employment have constructed a double seat that permits them to sit side by side while riding. Obviously this is a pleasant aid to conversation and therefore more enjoyable than the usual tandem arrangement. The seat is built with a steel frame, is fitted with springs, and is inclined just enough for comfort.

The Broad Seat Allows the Men to Sit Side by Side While Riding to and from Their Work

MERCHANTS LIGHT SHOPS TO MAKE WHITE WAY

Quite an interesting system of electric illumination is being employed by merchants of a medium-sized town in the Southwest. Beneath the awnings in the entrances of many stores, 100-watt opal lamps have been installed. In addition to lighting the fronts of the shops and the sidewalks, the lamps assist in illuminating the display windows. In order to insure uniformity, the system was not installed in a block until every merchant on both sides of the street agreed to have one of the lights in his store entrance. So far about 400 lamps have been mounted.

POWERFUL AERO SNOW SLED IS ALASKAN WINTER CAR

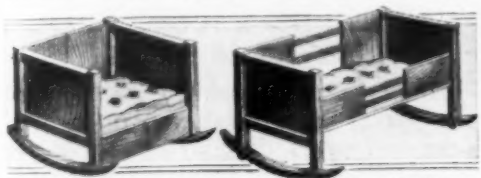
Motor sledding across Alaskan snow fields became a reality last winter when a northern sportsman and dog racer completed the construction of a high-powered machine designed for practical transportation purposes. It is of businesslike proportions and mounts a 60-hp. motor that drives an aerial propeller of the tractor type. A speed of about 35 miles an hour is easily attained under normal conditions. The driver's seat is in a snug cockpit protected by an inclined shield. The body is carried on two low sleds. Steering is accomplished through the rear one of these, which is considerably shorter than the front member. At the top of a semicircular frame that supports a pair of skids, ailerons are attached. These are em-

With Its 60 Horsepower, the Motor Gives the Squatty Snow Car Splendid Speed

ployed to hold the machine down and also to give it balance when curves are negotiated or strong cross currents of wind encountered. Iron claws, pivoted at the sides of the forward sled, serve adequately as brakes.

CHAIR CAN BE CONVERTED INTO A CRIB

In designing a mission chair which can be converted into a baby's crib, a woman inventor has produced a substantial article of furniture possessing double utility. The chair is of generous dimensions, with sides and back of the same height. The bottom, the front crosspiece, and the back are each made in two parts attached to their respective sides and reinforced with wooden strips which slide in grooves so that the sides can be drawn apart several inches. In this way the chair is transformed into a crib. The front cross-

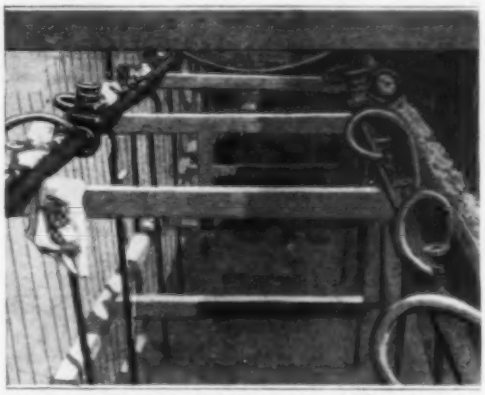


Chair Which can be Converted into a Crib by Drawing the Sides Apart and Turning Up the Front Crosspiece, Which is Hinged to the Seat

piece is hinged to the front edge of the seat and can be turned up to serve as one side of the crib.

SIMPLE WAY OF BUILDING SEWER IN WET SAND

By means of sand points—that is, pipes with pointed, perforated ends—which were connected through long suction pipes with a set of powerful pumps, a contractor building a brick sewer was able to keep water entirely out of what otherwise would have been a very wet trench. This arrangement also enabled him to leave just enough water in the sand in the bottom of the trench to make unnecessary the use of a form for the under side of the sewer. A skilled workman, by using a shovel and occasionally a template, was able to fashion the bottom of the trench so that brick could be laid in it. At 4-ft. intervals on the main suction pipes, laid on either side of the ditch, were



Water was Kept Out of This Sandy Wet Trench by Use of Sand Points: The Moist Sand was Molded to Hold the Brick for the Bottom of the Sewer so That No Forms were Required for That Part of the Work

hand valves by which the sand points could be turned off and on. In this way just the right amount of water was retained in the sand. Four pumps connected to 15-hp. motors were used.

CRUDE HORSE CAR SERVES OCEAN RESORT'S NEEDS

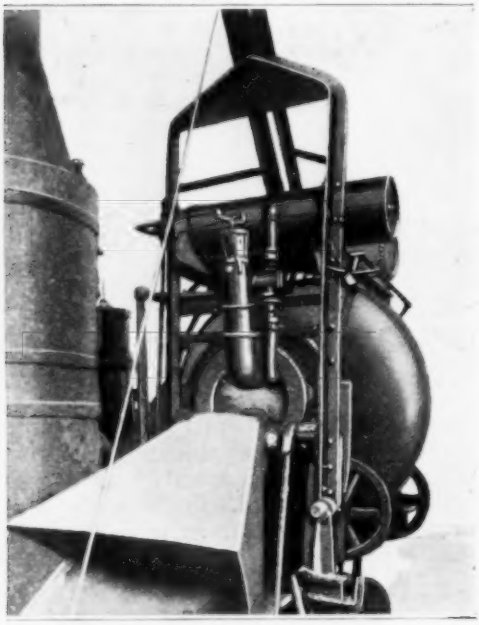
The transportation needs of North Beach, Florida, an ocean resort, are filled, in a measure at least, by a horse car that is of the simplest construction. The vehicle is long and narrow, with two rough benches extending its full length facing each other. Each end is open, provided with a step, and

Roughly Built Horse Car Which Carries Ocean-Resort Patrons to and from the Bath Houses

used as an entrance. At the sides are uprights which support a wooden canopy.

OIL HEATER MAKES CEMENT MIXING SAFE IN WINTER

Protection against possible freezing of wet materials in a cement mixer during cold weather is obtained at low



Oil Burner Which Forces a Flame into the Drum of the Cement Mixer, Thereby Preventing the Freezing of Materials in Winter

cost by using an oil-burning heater which can be attached to practically any mixing machine. Such a device unquestionably can save money for a contractor by making it safe to operate continuously when the temperature is low. The heater is provided with a 25-gal. tank which is mounted above the mixer and is connected by a pipe with a burner situated at the opening in the side of the mixing drum. Compressed air, obtained either from a hand pump or a compressor, is used to vaporize the oil and in this way a flame is forced into the interior of the drum, keeping the materials there thoroughly warm. The oil consumption is from 1½ to 2 gal. per hour. A somewhat smaller equipment is provided with a 20-gal. oil tank and operates without a compressor, the oil itself being kept under pressure by means of a hand pump.

ITALY WINS WORLD HONORS IN AEROPLANE BUILDING

While attention has been focused upon the aeronautical progress made by the British, French, and Germans, Italy seems to have forged ahead unobserved and captured the honors as the builder of the world's premier air craft. Information from apparently reliable sources indicates that the Italians now possess not only the fastest, but also the largest and best climbing aeroplanes in existence. Their success has been due to the perfection of extraordinary engines capable of producing from 500 to 700 hp. These motors are making possible the construction of planes that are larger than have heretofore been feasible. There is now being built in Italy a machine that will be driven by motors producing 3,000 hp. It is expected to carry 50 persons.

NEW TENNIS RACQUET CASE SERVES AS PRESS

Among late accessories for the tennis player is a combination racquet case and press that is durably made of sole leather and insulated with felt. The back is constructed of wood veneer and forms a solid, flat surface, against which the frame of the racquet is firmly held by four steel arms. These constitute the press, which is fixed to the inside of the cover, and are operated from the outside by turn-

When the Case is Closed, the Arms Press the Racquet Firmly against the Wooden Back and Prevent the Frame from Springing

ing a small disk. Dampness cannot enter the case and there is no danger of the racquet frame warping or the gut being injured.

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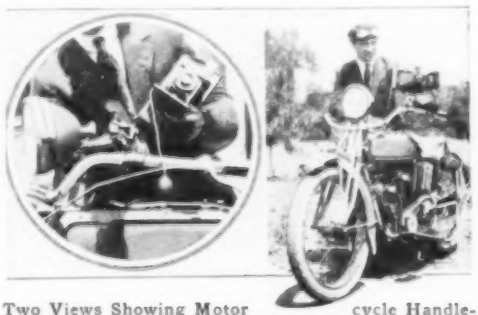
Showing the Powerful Derrick at Work Lowering One of the Reinforced-Concrete Intake Cribs, Weighing 150 Tons, into Place in the Harbor

MASSIVE CONCRETE CRIBS INSTALLED BY DERRICK

Two reinforced-concrete intake cribs, each weighing about 150 tons, were lowered into place in the harbor at Stamford, Conn., some weeks ago by one of the most powerful floating derricks available on the Atlantic coast. The structures were built on a platform erected adjacent to a pier, and when ready for installation were hoisted one at a time, moved a short distance to a point where excavations had been made for them in the bottom of the sound, and then dropped gradually into position. Despite their great weight they were handled without difficulty and sunk to a depth of about 25 ft. below the level of the near-by dock. Each of the structures is divided into two compartments. The screening chambers are equipped with traveling conveyors that elevate foreign matter, such as mud, leaves, drift, and fish, to the top of the cribs where it is discharged. Centrifugal pumps driven by 100-hp. motors are mounted in the other compartments and supply water to the condensers in a local gas and electric plant.

MAKING MOTORCYCLE SERVE AS FIRM CAMERA SUPPORT

By fitting a small attachment to one of the handlebars of his machine, a



Two Views Showing Motor cycle Handlebars Fitted with Tripod Head to Support a Camera

motorcyclist can advantageously eliminate a tripod from his photographic equipment. This has been done successfully by a press photographer who makes many exterior exposures and uses a cycle for transportation. A tripod head is mounted on a universal joint which in turn is held in place by a clamp. This arrangement permits a camera to be focused at any angle without difficulty. When a machine is stationary and supported by its stand, it is vibrationless even in a strong wind.

ELECTRIC FOOTBOARDS MADE FOR TRAFFIC POLICE

In an attempt to lessen the exposure to which traffic policemen in northern cities are usually subjected during winter months when they must stand on icy pavements many hours each day, an inventor has devised an electric footboard. It is a small rectangular contrivance supplied with heating element and arranged to be connected to a lighting circuit. When it is placed near a curb, adjacent to a lamp-post or an electric-light pole, current is readily obtained. Not only does the device provide a warm, dry place for a policeman's feet, but it can be made to radiate enough heat to aid materially in keeping the lower part of his body warm during frigid weather.

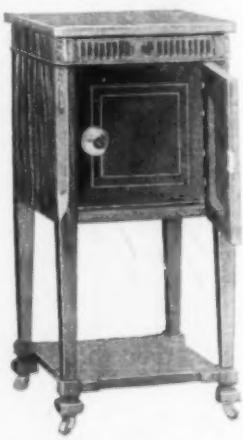
RED CROSS TO SEND FOOD TO FAMISHED PRISONERS

In connection with a definite statement by the Red Cross to the effect that the Germans are giving totally inadequate food supplies to their prisoners, that organization announces the formation of a prisoners' relief committee in Berne, Switzerland, which will endeavor to look after our soldiers who may be captured. At present there are about 100 Americans held by the kaiser's forces. Most of these are civilians taken from American merchantmen, while some of them are from gun crews.

The deplorable condition and the testimony of certain returned French soldiers who have been imprisoned, show that they suffered terribly from insanitary surroundings as well as from malnutrition. British, Canadian, and Australian prisoners are now dependent exclusively on food shipped from London, our Red Cross asserts. Already the Berne committee is sending bread to our fellow countrymen in Germany and arrangements have been made for transmitting letters and money from their families and friends. Assorted-food parcels and clothing will also be sent soon. In the meantime the Central Prisoners of War Committee of London has been acting for Americans held in Germany. By arrangement with the Teutonic government the food parcels are sent to the prisoners three times a fortnight.

SAFE FOR HOME USE SET IN MAHOGANY CABINET

A feature of a safe now on the market which makes it especially suited for home use is the tall mahogany cabinet in which the safe proper is set. Outwardly the article resembles a smoker's cabinet, with a drawer at the top, a wooden door, a lock on the front, and a shelf beneath. This wooden exterior gives it an appearance entirely in harmony with other household furniture. Being mounted on casters, the cabinet can be moved about easily.



TRAINING BALLOONISTS FOR WAR

By R. P. CRAWFORD

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A Daring French Observer Escaped from This Burning Balloon in His Parachute and Then, as the Wind Swept Him to One Side, He Seized His Camera and Obtained This Snapshot, Thus Performing a Feat Perhaps without Parallel

IN June of this year began the training of the first contingent of men who within a short time will be directing the aim of the big guns in France. This interesting part of our war preparations is being carried out at Fort Omaha, Neb., where for many years the government has owned a hydrogen plant.

The object of the balloon school is, of course, to turn out men capable of handling the big observation balloons on the French front. Ballooning is different from airplaning. The balloon's sole purpose is to enable an observer to watch the work of the guns as they batter at the enemy's trenches. If the aim is not correct he telephones to the gunners down below. On the other hand, the airplane serves for bomb dropping and spying behind the enemy's lines. The observation balloon stays put, in one place, and so is ideal for observation of any portion of the line.

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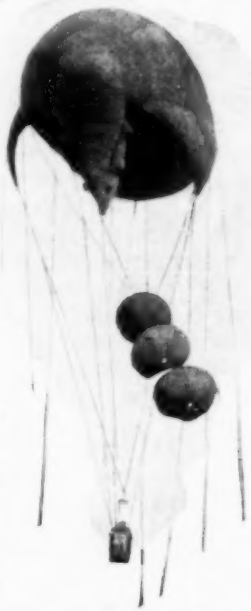
This Photograph was Taken a Few Moments Later Than the Accompanying One, by an Eyewitness on the Ground Who could Scarcely Discern the Imperiled Balloonist Descending Less Swiftly Than the Flaming Gas Bag

To become a balloonist attached to the Signal Corps requires approximately four months. During that time the youths are put through a rigorous course, including work with both free and captive balloons, class instruction, infantry drill, and general signal-corps work. The qualifications for a balloonist are much the same as for an airman: good eyesight, hearing, and physical health. All these qualities must be present to a degree above the normal.

It is, however, only the officers of a balloon company who make the observations. A company consists of 91 men and the entire number of enlisted men is necessary to carry on the miscellaneous work in handling the balloons. The young men who aspire to be officers must, generally speaking, be college graduates or have completed three years of such a course. They do not

go first to one of the regular training camps, but are assigned directly to the school at Omaha.

The main part of the instruction consists in actual balloon work. The student makes flights in both captive and free air craft. The very first lessons may be taken in a sham balloon contrivance which gives the novice some of the fundamentals of the game. It consists of a basket suspended from a sphere of canvas in the shape of a balloon, which in turn is fastened to the ceiling of a hangar. The student stands in the basket while the instructor proposes certain air conditions. He handles the ropes just as if he were in a real balloon. There are two ropes in the basket, one which, in a real balloon, allows the gas to escape gradually through a valve and another which controls the "rip panel" and allows the gas to escape in a body. The latter rope, of course, is usually pulled only when a balloon is near the earth, and an accidental pull at the wrong time would spell serious consequences for the observer.

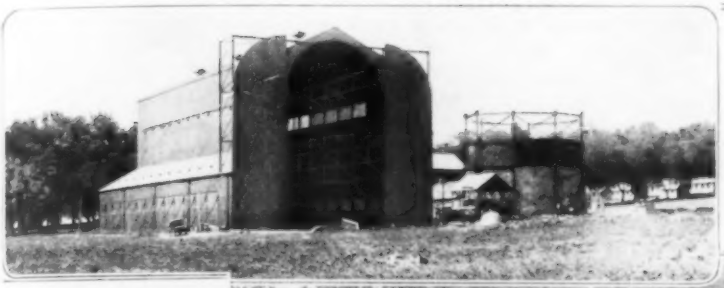


Captive Balloon in Which Students Make Ascents About Once in Every Two Days

On alternate days a student is given a hand at a big observation kite balloon. It is brought down and sent up every half hour, thus giving each pupil a chance about every other day. This balloon is firmly anchored with a ¼-in. steel cable to an automobile truck, the engine of which furnishes the power to haul it down. There is also a telephone wire running from the balloon to the ground by means of which the observer keeps in touch with the men below.

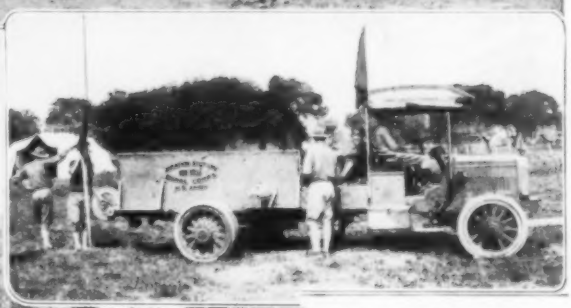
To make the work realistic and typical of actual conditions, representations of trenches and embankments are located about four miles away in the country. There smoke bombs are set off every few minutes. The balloonist in the basket, high above the fort, judges how far these bombs, supposed to be shells fired at the enemy, are missing the trenches. He either telephones down or marks on a map divided into sectors the places where the bombs have exploded. The men out in the country also keep track of the actual locations of the bombs. In the evening the two sets of records may be compared and it can be determined how proficient the students are becoming in judging distances. Flights in

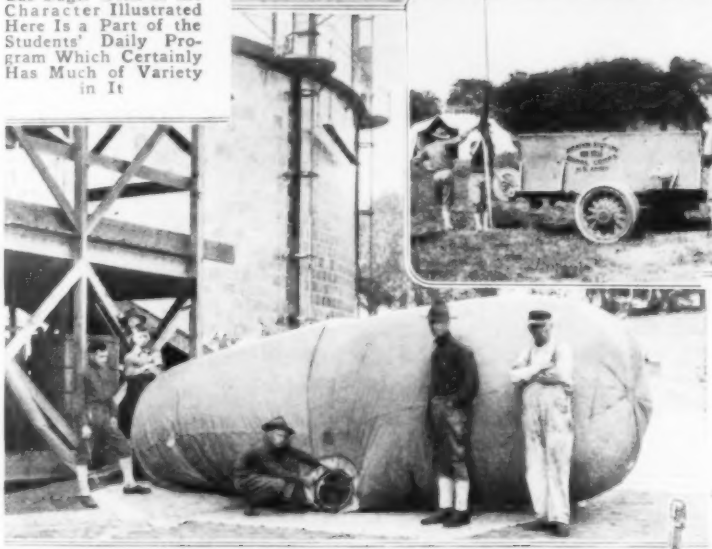
A Side View of the Same Type of Balloon as Pictured Above: It Is in These Craft That the Students Get Their Training in Observation under Conditions Closely Resembling Actual Warfare. The Portable Hangar is Also Shown



On the Left Is the Hangar and Hydrogen Plant at Fort Omaha Where Men are Now being Trained to Handle Big Observation Balloons on the Front in France. Gas Stored in the Tank is Used to Inflate Both Free and Captive Craft Used by the Students

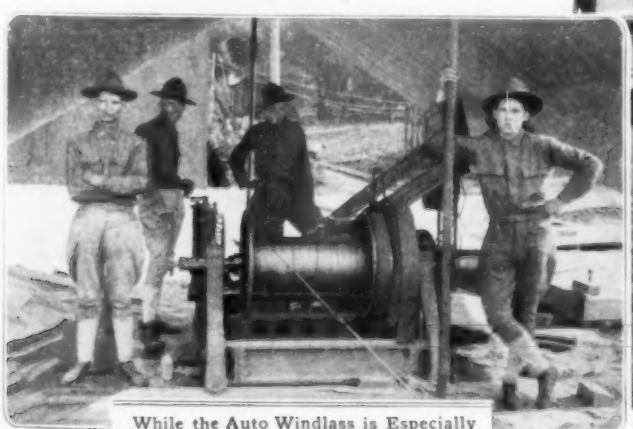
Drilling the Automobile-Truck Drivers: The Picture on the Right Shows Some of the Motor Cars Which Carry Hydrogen Tanks for Inflating the Big Gas Bags. Drill of the Character Illustrated Here Is a Part of the Students' Daily Program Which Certainly Has Much of Variety in It





Instead of the Anchor being Raised and Lowered from the Ship, in Ballooning the "Ship" is Raised and Lowered from the "Anchor," Which, in This Case, Is a Truck with a Powered Windlass on Which the Steel Cable is Wound

Inflating What is Called a "Nurse" Balloon, Used under Certain Conditions to Supply Limited Quantities of Hydrogen to Big Balloons



While the Auto Windlass is Especially Adapted to Field Work, Such Means is Supplemented at the School by This Electric Windlass

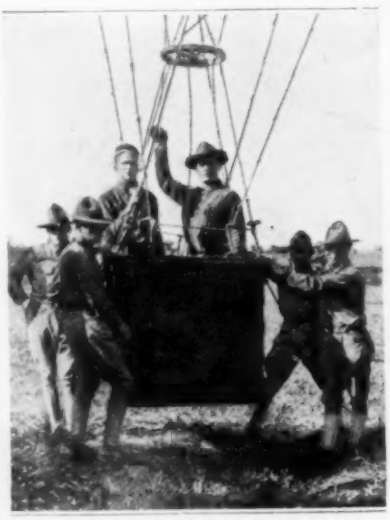
The Portable Telephone with Which Reports are Received from the Observer Stationed High above the Field: On the Accuracy of the Data Coming over This Wire Depends the Effectiveness of Large Fighting Forces. The Telephone Cable is Wound on a Reel by Hand

To Loiter Is to Court Death When Handling an Observation Balloon Close to the Firing Line, for Enemy Aeroplanes Are Ever on the Alert to Drop Fire Bombs on Such Conspicuous Targets. This Is One Reason Why Haste is Required in Such Preparatory Movements as are Shown in This View of Student Balloonists at Fort Omaha, Nebraska. For Them the Spreading Out of the Canvas Is Only a Matter of a Few Seconds

free balloons also form an important part of the instruction. Of course in actual warfare it is not expected that free balloons will be used. There is danger, however, that a captive balloon may break away at any time, and for that reason an observer must have experience in bringing the craft safely to the ground. Seven free flights in spherical balloons are made altogether, each one of which must be more than an hour long. One of these flights must be at night, one in which the pupil is alone, and one in which the student does all of the work in the presence of an instructor.

Field work is also taken up. The balloon and sufficient hydrogen tanks are loaded on automobile trucks and taken into the country where work is carried on under war conditions. A portable hangar, consisting of a large tent, is provided when it is desired to keep the inflated balloon out overnight.

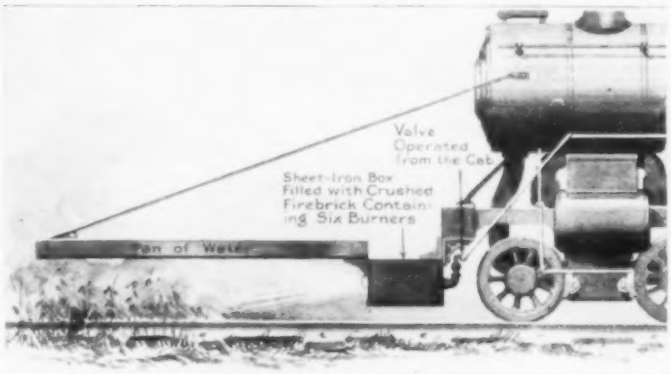
The student also receives some instruction in the general work of the Signal Corps, such as telegraphy and signaling. For the regular enlisted men there is balloon drill every morning. This consists in spreading canvas and making ready to inflate a balloon in the field. As speedy work is required here as on the battle front. The enlisted men also care for the automobile trucks and hold down the balloons while they are being inflated and removed from the hangar. Parachute work is also part of the instruction for the observers. In actual work on the battle front hostile airplanes may at any minute drop fire bombs on the balloon. In such a case the only safety for the observer lies in the prompt use of the parachute. Besides receiving a first lieutenancy in the Signal Officers' Reserve Corps at the end of the course, the student is licensed as a balloon pilot by the Aero Club of America. Also, he is in line for the most adventurous type of service which the war has to offer.



An Instructor and a Student About to Make an Ascent in a Kite Balloon

WEED BURNER IS ATTACHED TO OLD LOCOMOTIVE

To eliminate growing vegetation from the tracks of the Spokane, Portland, and Seattle Railway during the past summer, an old oil-burning locomotive was equipped with an incinerator and dispatched over the line. The apparatus was designed by the mechanical department of the road and performed efficiently when placed in operation. Fuel oil and steam to atomize it is carried through pipes to a series of six burners mounted a few inches above the rails and just ahead of the leading pony truck. They are arranged in a sheet-iron box that is filled with crushed firebrick and are similar to large blowtorches. To deflect the heat against the roadbed, a large shield, supplied with a water pan, is attached with stay rods to the front of the locomotive and supported close to the track. Back of the pony trucks there is a sprinkler that is used as a protection for the ties. The engine carries a supply of fuel oil and can cover from 15 to 20 miles a day depending on the density of the vegetation.



Carrying an Auxiliary Supply of Fuel Oil in a Tank Car, the Engine Averages from 15 to 20 Miles a Day While Freeing the Roadbed of Growing Weeds

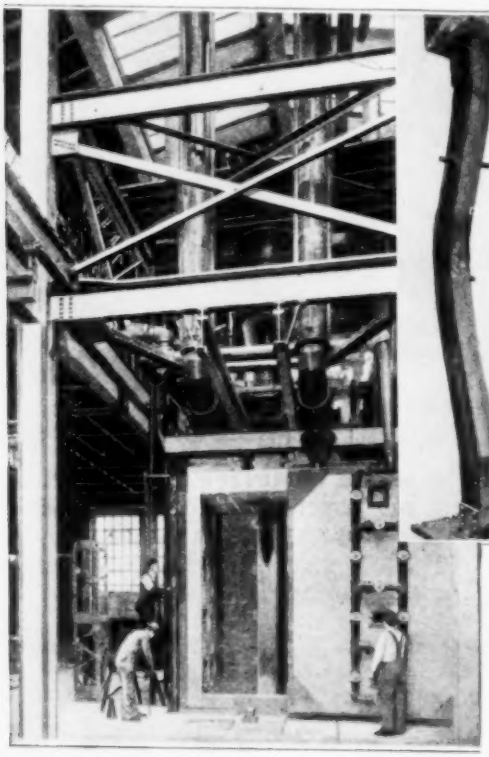
COURTESY OF THE AMERICAN MUSEUM OF NATURAL HISTORY

SAN SALVADOR RECOVERING FROM DISASTER

THE stricken people in and about the city of San Salvador, the capital of the little republic of Salvador in Central America, are slowly recovering from the sudden and fearful destruction which was wrought in their midst by the recent earthquake and volcanic eruptions. To the wreckage produced by the seismic disturbances was added damage caused by fires and torrential rains. The latter filled the débris-strewn streets with mud, as the accompanying illustration shows, and greatly hindered the work of reconstruction. Fortunately the disaster, though great, was not as overwhelming as early dispatches indicated.

COLUMN-TESTING APPARATUS USED BY UNDERWRITERS

For testing structural columns of different sizes and types, elaborate apparatus has been provided in one of the large physical laboratories of the National Board of Fire Underwriters. It is claimed to be the only equipment of the kind ever constructed for such a purpose and is now being used for the first time. Essentially, it consists of a large gas furnace in which a pillar can be subjected to great pressure along with high temperatures and the effect of each studied. Whether a specific column could carry its load in the presence of intense heat, in what way the materials would withstand flames, what would result if a stream of water were played upon the member during a fire, and how much weight would cause it to break, are all questions of importance that the apparatus answers definitely for the benefit of engineers, architects, and others. Two of the heavy brick walls of the furnace are movable and all of them are equipped with gas blast burners. Above the furnace is a ram capable of exerting a downward pressure of 256 tons. Under test a column is subjected to a temperature of 1,500° F. at the outset. This is increased step by step until 2,300° is reached. Mica windows in the furnace walls permit the action of heat and pressure to be watched and records made every five minutes.

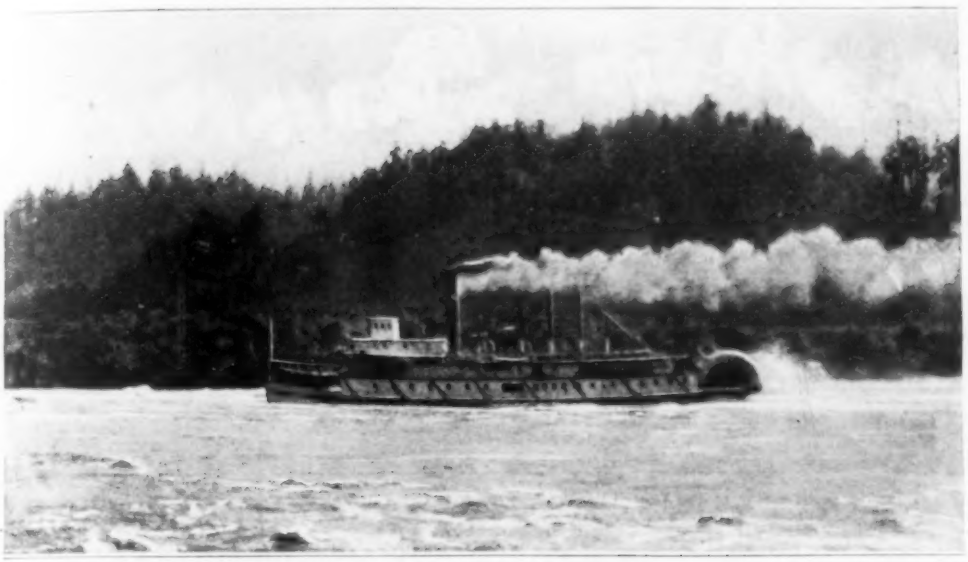


One of the Movable Furnace Walls Opened to Show a Large Building Column in Position for Test: The Ram is Supported by the Steelwork Above, While the Pipes Are Flues for Discharging Fumes. Mica Windows Are Provided for Observation

Two Views of a Steel and Concrete Column That Failed to Hold Its Load When Subjected to Intense Heat during Tests in the Furnace

FINE METAL BORINGS SEPARATED BY NEW METHOD

The chief chemist of a foreign railway has perfected a method of automatically separating fine gun-metal and white-metal borings, thereby supplementing the old method of separation which was satisfactory for coarse borings only. After being transferred to bins and graded as to size by suitable means, the borings eventually are discharged into special furnaces in which the separation of the two metals takes place. Each furnace is made of tubes, one fitted inside the other. In the space between the walls of the furnace is a coil of pipe with suitable perforations for heating the inner tube with gas. The smaller tube revolves and as it turns the hot borings and the white metal which has become liquid, pass from it into revolving screens of very small mesh. The white metal escapes through the screens into a heated container whence it is run off into molds. The clean gun-metal borings are passed along and dealt with separately.



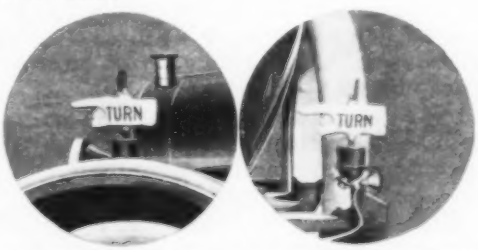
At Express-Train Speed the "Bailey Gatzert," with 125 Passengers Aboard, Shot the Treacherous Rapids in the Columbia River without Disaster

PASSENGER VESSEL SHOOTS COLUMBIA RIVER RAPIDS

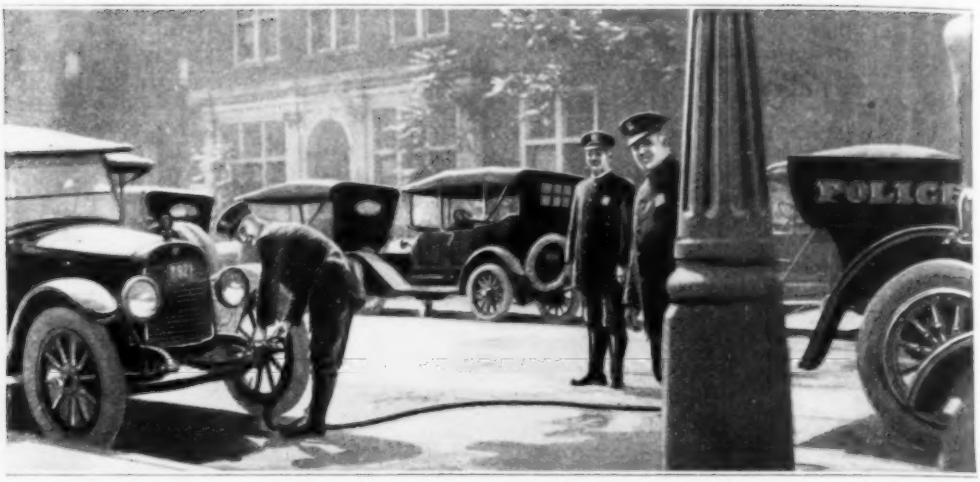
With 125 passengers aboard, the stern-wheel steamer "Bailey Gatzert" negotiated the roaring Cascades of the Columbia River at express-train speed some weeks ago. So far as is known this is the first time a passenger vessel has attempted the dangerous trip through the rapids. Owing to high water the boat on its upstream voyage was barely able to pass the locks at the Cascades. On the return trip, later in the day, the water had risen to such a stage that the locks had been closed. The captain faced the alternative of tying up the steamer or running the rapids. He chose the latter course, piloted the ship to the middle of the river and plunged downstream, braving dangerous rocks, cross currents, and whirlpools at a startling speed. The feat was accomplished without a mishap. Twenty-four years ago the steamer "D. S. Baker," towing a barge, shot the Cascades successfully. It is said that previous to that time four freight vessels had also made the trip. The "Bailey Gatzert," however, was the first passenger boat to take the chance.

ORNAMENTAL AUTO SIGNAL HAS ELECTRIC CONTROL

A new auto signal of ornamental design consists of an electric motor that operates a white translucent hand bearing the word "Turn," and a semaphore set at right angles to the hand. There are two of these signals in each outfit, one for the rear and one for a front fender. They are controlled by a switch mounted on the steering wheel and can be set with the hand pointing to the front, rear, right, or left. The sides of each semaphore bear the words "Go" and "Stop" respectively, and are displayed according to the position of the hand. At night the signal is illuminated by a light within the hand.



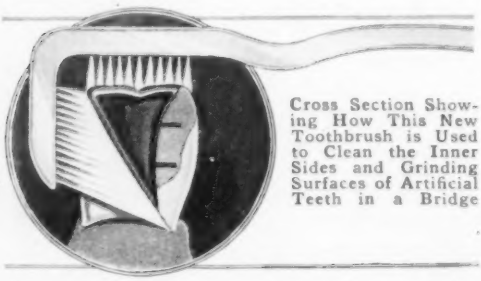
The Signals at the Front and Rear are Controlled by a Switch Mounted on the Steering Wheel. Current can be Taken from the Storage Battery or from Dry Cells



Preparing to Haul a Car to the Pound in Detroit: A New City Ordinance Requires That Automobiles Left at the Curb in Violation of Certain Rules shall be Kept by the Police Until a Fine is Paid

SPECIAL TOOTHBRUSH HAS TWO SETS OF BRISTLES

A special toothbrush, the bristle-holding end of which is bent to form a right angle, has been invented to use on the teeth which form a part of a bridge of gold or other materials. The bristles on the outer end of this brush vary in length, with the longest ones at the tip, and are set at an angle, thereby forming a diagonal brushing surface



Cross Section Showing How This New Toothbrush is Used to Clean the Inner Sides and Grinding Surfaces of Artificial Teeth in a Bridge

that corresponds to the surface on the inner side of the false teeth. This surface is difficult to clean with an ordinary brush.

CThe X-ray has been employed recently in determining whether certain New York troops have tuberculosis. Of the first 600 men examined by this means, 22 were found to be so infected as to disqualify them for military service.

ENFORCE NEW TRAFFIC LAW BY IMPOUNDING AUTOS

Motorists in Detroit, Mich., where there are a large number of car owners, have facetiously remarked that "nowadays the automobile leads a dog's life." The occasion for this complaint is the enforcement of a new city ordinance which resembles the provisions for dog pounds by requiring that automobiles left at the curb in violation of regulations shall be impounded. Since the passage of this regulation, last February, more than 5,000 cars have been hauled away to the pound, which is a roped-off area in one of the downtown squares. A fee of $3 must be paid before a car is released.

This penalty is imposed for double-row parking, for parking in a safety zone, for parking within 10 ft. of an intersecting cross walk, or within 15 ft. of a fire hydrant, for parking an hour anywhere in certain congested districts, and for allowing a car to stand in front of a theater, church, office building, or other structure where large numbers congregate. This is only a part of the list of prohibitions which have been deemed necessary to relieve congestion in this city. Special police, nicknamed "dog catchers," mark cars so as to know when they have stood at the curb over an hour.

OUTDOOR SAFETY VAULT FOR MOVIE FILMS

An outdoor vault of solid concrete has been constructed on the grounds of a California movie studio, for the safekeeping of negative picture films, which are often of great value, while the material is extremely inflammable. The building is rectangular and provided with double steel doors on two sides, each entrance being further protected by galvanized-iron outer doors of special fireproof construction, operating automatically on roller tracks which incline inward. An iron railing surrounds the building and strict rules govern its use. A tank containing water maintained at a depth of 18 in. occupies the full extent of the roof, and the pipes of a sprinkler system run along the top of the outside walls, so that complete curtains of running water protect the building in case of fire near by. These precautions are fully justified by the fact that half a million dollars' worth of film is sometimes stored in the vault.

Safety Vault for Picture Film at a Movie Studio: The Building Is of Solid Concrete and Its Roof Is a Water Tank. At Times It Holds $500,000 Worth of Film

CHANGEABLE SIGN TEACHES SAFETY FIRST

A large sign which is almost sure to attract attention from day to day because its legend is changed frequently has been erected near the entrance of a big mining company's works as a feature of a safety-first campaign among its employes. The board is divided into eight horizontal panels so constructed that they will each hold a row of 6-in. enameled letters. With these letters new safety maxims are spelled out daily, hence the legends never become so old as to be ignored by the men. Some space is usually devoted to the accident record of the previous day. The sign is surmounted by a clock and at night is illuminated by flood lights.

Changeable Safety-First Sign near Entrance to Mining Company's Works: New Legends are Placed on It Daily so That the Men Get in the Habit of Looking at the Board as They Pass

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FRANCE RELIES UPON SWIFT RECONNAISSANCE PLANES IN PATROLLING SAHARA DESERT

REPRODUCED herewith is a striking photograph of a sand-bound city in the midst of the great Sahara desert. The exposure was made from an aeroplane and shows with remarkable clearness the character of that romantic, desolate region. Close scrutiny will disclose that all of the houses are fortified by embattled roofs, a precaution that has been observed for centuries. Practically all of this vast territory is patrolled by airmen. Confronted with the activities of German agents, the French army has used this effective means of discovering rebel bands and suppressing insurrections. The sight of air craft has had a tremendous effect upon guerilla bands, and when this has not proved sufficient to meet an emergency, a few bombs have done the work.

EGGS CANNED LIKE CORN FOR TABLE USE

Experiments in canning eggs have been conducted by a large poultry dealer with such success that it is now proposed to develop the process commercially. Six fresh eggs are broken into a can, which is then sealed and placed in steam where the contents are cooked in the same manner as canned corn or peas. It is said the process keeps the eggs fresh and fit indefinitely, and on being opened the coagulated mass can be sliced and served like meat roll. A proposed variation of this method is to place each egg in the can in a parchment wrapping so that it can be removed separately when the container is opened.

JAPANESE LAKE PRODUCES MUSICAL SOUNDS

A natural phenomenon which occurs at Lake Haruna, Japan, during the winter months has made that beautiful body of water known to natives and foreign travelers as "the musical lake." It seems that when the water is in the process of freezing, strange sounds resembling the firing of muskets or small cannon can be heard on the surface of the lake, particularly at night. This apparently is produced by the straining and cracking of the ice, but for some reason the sounds occur in a sort of rhythmical cadence and are said to possess a remarkable musical quality not found in other instances. Doubtless the unusual and picturesque setting of the body of water serves to accentuate the rather weird impression produced. At times as many as 60 reports a minute may be heard resounding across the surface of the unusual lake.

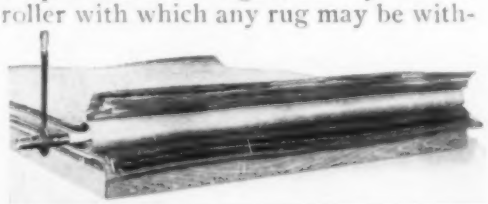
MOTOR-CAR SPECIALTY SHOP OPERATED IN OPEN AIR

To the list of unusual specialty shops has been added an open-air, carbon-removing station for motor cars. The method and equipment employed enable one attendant to care for as many as 12 cars simultaneously. Carbon remover is stored in an elevated tank that supplies a 1-in. pipe to which a dozen rubber tubes are connected. The latter convey the preparation to the cylinders.

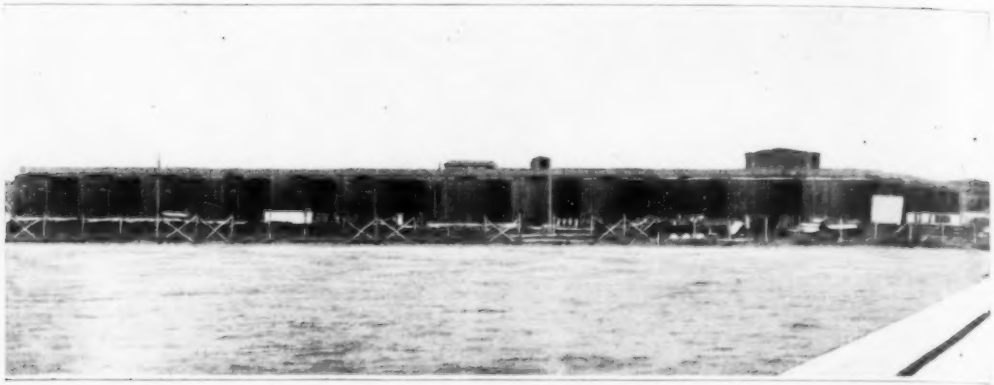
At This Outdoor Automobile Station, One Attendant Is Able to Remove Carbon from the Cylinders of a Dozen Cars Simultaneously

DEVICE FOR EXTRACTING RUGS FROM A PILE

The tedious task of displaying rugs to purchasers is lightened by a new roller with which any rug may be withdrawn from its pile so that the whole of it may be viewed. A long tubelike member, fastened to the edge of the rug, is provided with a ratchet and lever by means of which the rug may be quickly rolled up and then removed from the pile.



Rug Extractor Which Makes Easier the Task of Fully Displaying Any Rug in a Pile



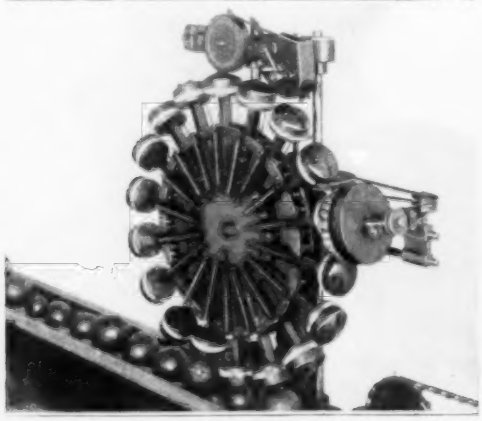
Extensive Potash Works at San Diego, California, Which Sprang Up in Response to Demands Created by [illegible] is Protected by an Armed

ODD PLAN OF AMELIORATING MOTOR-CAR TIRE TROUBLE

To safeguard motor-car tires against blow-outs, an inventor proposes the novel scheme of installing small reservoirs in, or on, the wheels of a machine and connecting them with the tires for the purpose of cooling the air and thereby preventing the excessive pressures that are occasionally produced by expansion resulting from heat. The reservoir would serve as a radiator through which the air of a tire would be circulated and cooled.

BRANDING MACHINE SEARS NAME ON ORANGES

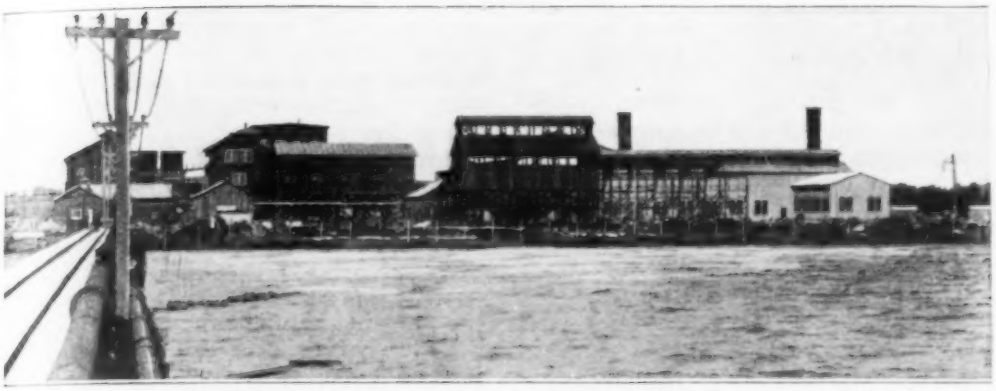
Not satisfied with marking its oranges with stickers or wrappers, a fruit growers' association is now branding its trade name on its fruit with electrically heated dies. The branding machine has a revolving wheel carrying 18 radiating plungers, on the end of which the trade name is embossed. The temperature of the letters is governed by a thermostatic apparatus. In revolving, the markers pass beneath an inking device and then strike the oranges one after another as they are fed beneath the wheel on an endless belt composed of cup-like units. The heated letters sear the skin so that the ink, which is indelible, penetrates it and cannot be removed. This machine's capacity is 360 oranges per minute. Others of similar design are made for pears and apples. In some cases the letters are seared on without using ink.



Each of the 18 Plungers Carries the Trade Name Embossed on an Electrically Heated Plate

WAR-MADE POTASH WORKS GUARDED CONSTANTLY

The war-time shortage of potash that has resulted because Germany has heretofore been the principal source of supply for that product, has given a great stimulus on the Pacific coast to the production of potash from kelp, which is to be found in vast beds in the ocean. On the water front of San Diego is an extensive potash plant which is only two years old and is engaged in turning out large quantities of several different products. The uninterrupted operation of the



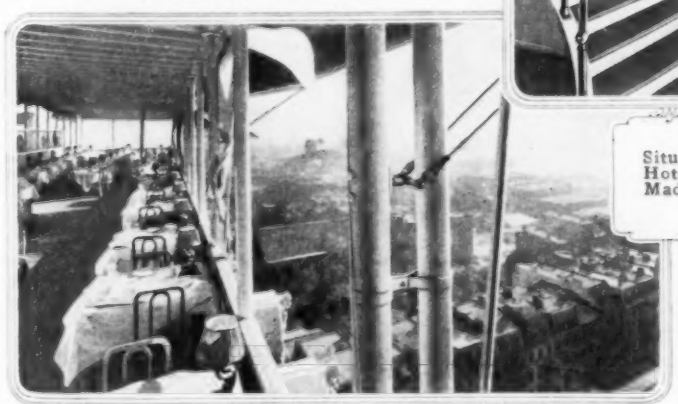
the War: In Order That the Output of Various Valuable Products may Not be Interfered with, the Plant Guard Day and Night

works is of such vital importance at this time that an armed guard, equipped with machine guns and powerful searchlights, is on duty day and night, while patrol boats ply the water front. The employes are subjected to the most rigid examination before entering upon their tasks.

HOTEL ROOF CAFE HAS ATMOSPHERE OF STEAMER

One of the latest innovations in the restaurant line is a marine café that has lately been established on the top of a Brooklyn, N. Y., hotel building. Masts have been erected, searchlights installed, life preservers hung in conspicuous places, and nautical trappings employed from "stem to stern" wherever possible, to give the place the atmosphere and appearance of an ocean liner. Tables and chairs are arranged about the edge of the roof on what might be termed a "promenade deck," while the central portion of the canopied space is elevated several feet above the surrounding part and connected with frequent flights of steps. Because of its novelty, the café is one of the local show places and attracts New Yorkers as well as the out-of-town visitors who form the backbone of café life in most big cities.

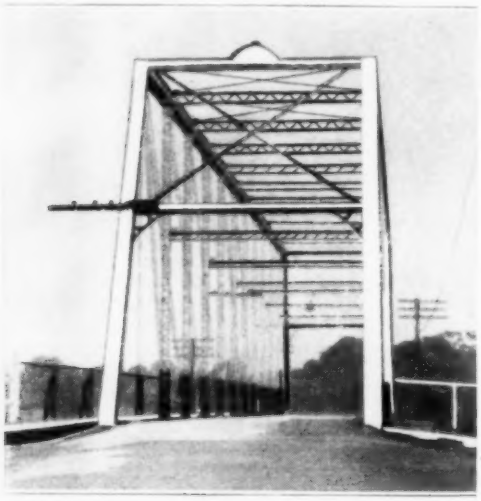
Situated on the Roof of a Brooklyn Hotel, This Marine Café has been Made to Resemble the Deck of an Ocean Liner



From Their Tables the Diners Obtain a Broad Panoramic View of the City with the Water Front in the Distance

BRIDGE IS PAINTED WHITE AS SAFETY MEASURE

For the purpose of increasing its visibility at night, a highway bridge spanning a stream in one of the mid-



Under the Glare of Motor-Car Headlights the White Bridge Stands Out Conspicuously at Night

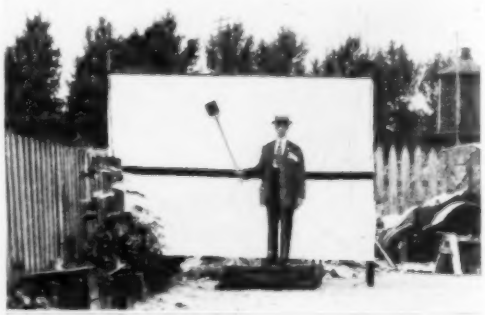
western states was painted white some time ago. The result was so satisfactory that the commissioners decided that all bridges in the county should be similarly finished as rapidly as their repainting became necessary. For a distance of four feet above the floor, however, the steelwork, with the exception of the portal, was painted black. This, of course, was done because mud splattered by passing vehicles would soon make the lower part of the framework unsightly if it were white.

GERMANS PAINT AIR CRAFT IN BEWILDERING COLORS

According to recent reports from the western front, the Germans are camouflaging their air craft by painting them in the most vivid hues obtainable. The effect in many instances is supremely grotesque and dazzling. They are indulging in a riotous orgy of color and devising combinations that exceed the most fantastic kaleidoscopic effects ever attained by savages. An Albatross or Aviatik, for instance, may have a green nose and a red body striped with brilliantly variegated bands. One wing may be blue on top and yellow underneath, while another is white on its upper surface and green on the underside. Some machines have green bodies, yellow noses, and red wings. Others may be red with green wings. Clashing primary colors are tiring to the eyes and many of the combinations have fairly bewildered allied pilots. It is assumed that the Boche is conducting an elaborate experiment to ascertain whether such camouflage will make it difficult for enemy airmen to determine the range of German planes.

SIMPLE TESTING OUTFIT FOR AUTO HEADLIGHTS

A simple outfit for testing automobile headlights, devised by a police department, consists of a large screen of white oilcloth and a 5 by 5-in. piece of green glass set in a frame having a long handle. Across the screen, 42 in. above the ground, is a horizontal black line. Headlights to be tested are placed 75 ft. from the screen and their rays turned full upon it. If, on holding the piece of glass against the oilcloth above the black line, it appears green, it shows that the rays of the lamps are not properly confined. If the glass appears to be black instead of green it is evidence that the lamps are correctly focused.



Oilcloth Screen and Green Glass with Which Police Test Automobile Headlights

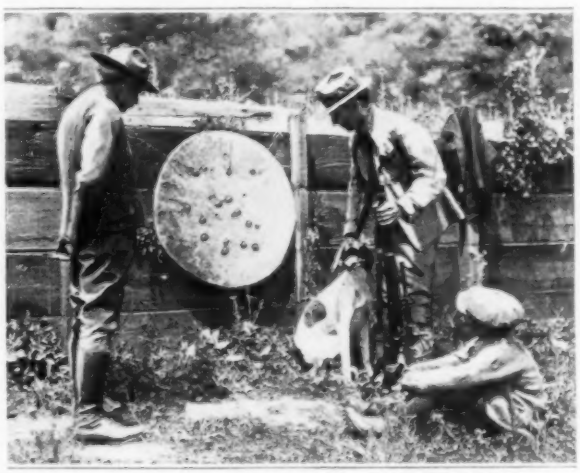
PUTTING ARMOR BACK IN THE DISCARD

By EDWARD C. CROSSMAN

A SMALL matter of five hundred and sixty-odd years ago that tried and true knight, Launcelot de Montmorency, thought he saw a bully chance to harpoon a half dozen or so low-born English churls in the front line of the English battle front near the village of Crecy. Wherefore Launcelot dropped his lance to rest, and, an armored whirlwind that clanked and rattled as it moved, he and his steed charged down on the invaders' line.

At the range of 100 yd. there spurted a jet of blue smoke from the threatened line, and there rose over the yells, the shrieks, and the clatter of steel on steel a most unfamiliar bang. The French knight rolled off his surprised steed with a loud crash and clatter of steel plates. Forsooth there was naught but a little round hole in his corselet, and yet he was dead.

That one shot put the kibosh for five hundred years on the fashion of wearing cast-iron clothes when expecting trouble with the chap across the way. Armor hung on stubbornly, but little by little the fighters abandoned armor belts in favor of higher speed. Some branches of cavalry clung to armor as late as the war of 1871, the cuirassiers, for instance. A pathetic example of the futility of such armor is in the Springfield museum. There is the helmet of a French cavalryman, and his cuirass, picked up on a stricken field of the first war with Germany in 1871.



Viewing a Piece of Steel Which Marksmen Were Able to Penetrate at 700 Yards with a New Bullet That Promises to Make Light Armor Useless

Through the front and back of the cuirass there is a little round hole. The poor Frenchman's body was between these holes, you'll understand. Through the helmet there runs the frightful slash of a saber, swung by a husky German arm. The spectator may guess whether bullet or saber cut came first: either was fatal.

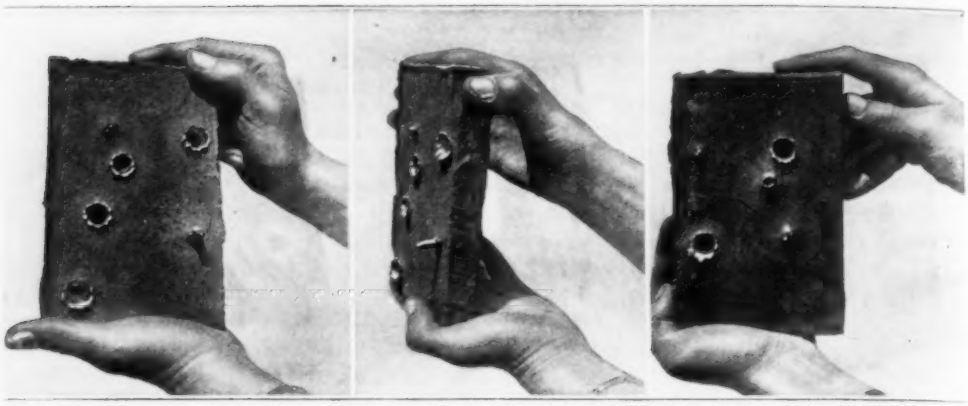
Military men laughed heartily at the mention of protective armor for land fighters. They pointed out the range, the penetration of the military rifle, and the tactics adopted by all modern armies of depending on distance, concealment, and some digging in to nullify the frightful power of this modern rifle.

Then came the Great War.

Now, with it just over three years old, we have the spectacle of the infantrymen of all armies wearing steel helmets sufficient to turn shrapnel and shell splinters, rifle bullets at long range — and possibly rifle bullets at close range, judging by one test made in this country of a helmet that turned the bullet of our army rifle at 50 yd. French and British officers go in wearing the old cuirass again, only this sort is built up of steel and canvas layers or else woven of chain mail.

A man in Dover, Del., stood the other day in an armor coat of his invention and let a soldier fire our army rifle at him at 25-yd. range with perfect safety.

The German infantryman is given a supplementary steel front for his



The Center and Left-Hand Views Show a Piece of One-Inch Tough Steel Penetrated by the New Bullets. Two Cores are Shown with Their Noses Through. The Dent near the Bottom was Made by a Service Bullet. That the New Missile Makes Funnel-Shaped Holes is Shown by the Right-Hand Plate Which was Shot at from Both Sides

helmet that will stop at close range the bullet from the French or British rifle.

Aeroplanes carry more and more armor, armor for the gas tank, for the passengers, and for the machine gun.

Tanks waddle serenely through blizzards of bullets that crackle and clang on their steel sides like hail on a tin roof, only this sort of hail hits—each pellet of it—with the energy of more than a ton.

Motor cars dash into the middle of threatened infantry lines and turn chattering machine guns into the advancing ranks without suffering from the return fire. The government is building many such cars.

Still the military rifle has its terrific punch and range. Still it sails through a half inch of mild steel at the muzzle. It has lost none of its potency that made armor for land fighting nearly unthinkable before this war.

Steel has been improved, but greatest of all reasons for the increasing adoption of armor for man and his motor car and airplane is the astonishing change in tactics that restricts fighting to short range and makes movements of troops correspondingly small.

A Regular Service Bullet is Shown on the Left, a Steel Core in the Center, and a Finished Armor Piercer, with a Soft Nose, on the Right

But, just as the big gun shell kept pace with every improvement in armor for fighting ships, now comes an improvement in military-rifle bullets to put a temporary end, at least, to the rage for wearing clothes made in the rolling mill. While the race between big gun and ship armor has no end, because the ship can carry almost any weight, the land version of the same contest must quickly end because the weight-carrying capacity of man, motor car, and aeroplane is very limited.

Captain Clay of the ordnance department of our army designed, and had made, some months ago the first armor-piercing bullet turned out in this country. Already it has sufficiently worried the makers of steel defense for cars and planes to make them hurriedly seek alloys and heat treatments in the endeavor to keep out the new missile.

Modern military-rifle bullets are made of lead cores, with a tough jacket of sheet steel or a mixture of copper and nickel much like German silver, to make the bullet hold to the lands of the rifling under the tremendous thrust of the powder gases. Just what happens when one of them hits steel we don't know, but we do know that

they invariably blast a hole much larger than themselves. The limit for the bullet from our army rifle is roughly a half inch of mild steel at 50 ft. A quarter inch or less of chilled, or treated, steel used for armoring field guns and shields keeps the bullet on the right side—considered from the standpoint of the men behind.

The Clay armor-piercer bullet consists primarily of a secondary bullet of hardened steel inside of the main missile. In the case of the bullets turned out for our army rifle and sent out to the writer for trial, this hard steel slug is .22 in. in diameter, or, the diameter of a .22-caliber lead bullet of the familiar shooting-gallery sort, and it is ¾ in. long. The point is shaped roughly like an ordinary bullet.

Plate of Half-Inch Steel Punctured at 300 Yards with the New Bullet: The Topmost Mark, a Dent, was Made with a Service Bullet at the Same Distance

This steel slug is placed inside the core of the main .30-caliber army bullet, with the base resting practically on the base of the jacket of the regular bullet. Around it, of course, is the lead core of the bullet, and around that in turn is the cupronickel jacket, so the rifling can press inward against merely tough jacket and leaden core as with the ordinary bullet.

A second improvement is the use of a soft nose—that is, with the jacket partly cut away at the extreme point of the bullet, exposing the soft lead core. This makes the bullet "bite," or "take," on the glass-hard surface of treated steel armor at a slight angle to the course of the bullet, whereas the bullet with the full jacket would glance off and go on harmlessly as the makers of the sloping-surface armor intended it should. Getting direct right-angle hits on modern armor, whether it be on motor car, helmet, or tank, is difficult, and penetration is impossible when the bullet glances blithely off.

The sloping shoulders of the ordinary sharp-point bullet, cased in a tough jacket, merely slide off inclined surfaces, but the soft lead core, exposed at the point, even though of the same form as the full-jacket missile, flattens out on impact, giving a grip on the steel, and adding greatly to the disposition of the bullet to enter armor set at a slight angle to the course of the bullet.

The steel slug continues right through the most unreasonable amount of mild steel and gives just as surprising results in treated armor steel, compared with the penetration of the service bullet. While the jacket and the core of the bullet disappear after the bullet gets a certain distance, the steel core keeps on going. The hole made in steel is thus of a peculiar funnel shape, ¾ in. wide where it enters the steel, and tapering down to .22 in. where the slug emerges.

Our own trials, made with the early form of the bullet, which has now been improved by Captain Clay, developed that it gave more than a hundred per cent increase in mild steel at the muzzle, and that the proportion grew in favor of the Clay bullet as the range was extended. Taking steel of the same tensile strength and character, the service bullet just got through a half inch. The Clay bullet went through an inch of mild steel at the muzzle.

Then we turned to a sheet of rather tough, but not treated, steel of unknown ancestry and history obtained from a scrap pile at an iron works. This sheet is 3 ft. across and .27 in. thick. Through it the service bullet went at 300 yd., but failed at greater range. The new steel-core bullet went through at 700 yd., the longest range at which the plate could be seen against its background.

Against treated, tough, armor steel the work of the bullet is still more remarkable. It more than doubles the penetrative range of the service bullet against the light, tough armor of the aeroplane. It makes the famous tanks vulnerable to rifle fire, and it strips off the armor of the motor car and puts the crew out into the blasts of lead of the stricken field, by its ability to get through the armor that has so far been considered adequate.

At 300 yd. it clanged merrily through a ½-in. piece of mild steel which the service bullet penetrated at the muzzle but no farther, so you can imagine what it would have done to the famous "tin-clads" of Admiral Eads which fought some of the fresh-water battles of our Civil War.

Once more a Yankee invention bids fair to overturn some of the customs of the game of war. A few machine-gun belts full of cartridges loaded with the new bullet will serve to put armor on the scrap heap, save as used—like the shrapnel helmet—not to turn bullets, but overhead shrapnel, which is just a lot of leaden balls at low velocity.

ATLANTIC STEAMERS FITTED WITH MINE PROTECTORS

Some of the Atlantic liners that are running the submarine gantlet have been equipped with a new type of mine-protecting device that is reported to have proved meritorious. For obvious reasons it has not been considered advisable to give general circulation to the details of the apparatus. It is permissible, however, to mention that it is understood to consist, in part, of a large net that, when attached at the bow of a vessel, extends about 50 ft. forward and several yards on either side of the stem. It is apparently a large fender that picks up contact mines, or tosses them aside, when they are encountered in the immediate path of a ship.

Bow of Steamship "Lapland" Showing at Least Part of the Mounting for One of the Mine Protectors: The Large Net That is Supposed to Extend Ahead of the Stem has been Removed

THOUSANDS USE TERMINAL DURING ITS ALTERATION

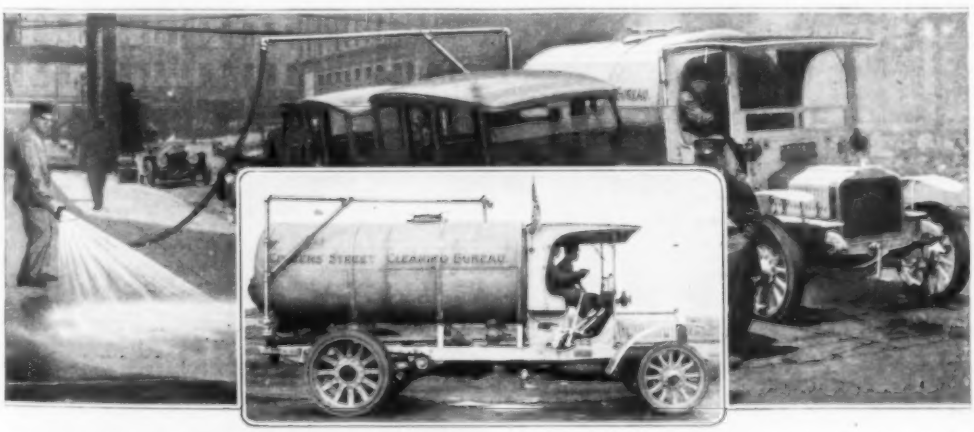
So carefully did contractors plan their work in making recent alterations in a Los Angeles railway terminal that the thousands who daily use the building were put to little or no inconvenience, and some scarcely knew what was going on. The principal change was the substitution of ramps for six slippery stairways which had caused many accidents and costly damage suits. An elevator was installed near the center of the building, a hole having been cut through the reinforced-concrete floor for the purpose, thereby giving access to the garage that occupies the lower level. All new material

Above Is One of the Ramps Which were Installed in Place of Stairways in a Los Angeles Station without Discommoding Frequenters of the Building. The Temporary Elevator for Handling Débris and Materials is Shown at the Right

and débris were handled by way of this elevator, auto trucks carrying it in loads to and from the garage. Half of each stairway was removed in turn, an incline built in its place, and then opened to the public. Temporary partitions of cloth screened off the public passageways and kept out the dirt. The changes cost between $25,000 and $30,000.

UTILIZE STREET FLUSHERS IN CLEANING SIDEWALKS

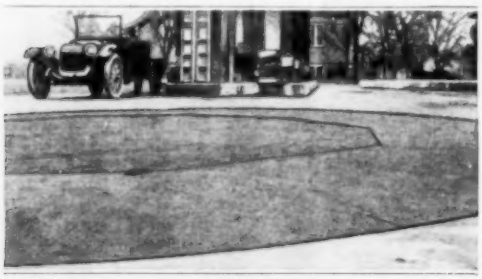
To enable the sidewalks in the business section of a large city to be readily cleaned at night, an attachment has been devised for street-flushing machines. It consists of a braced extension pipe supported at a height that permits it to clear the tops of motor cars and other vehicles that invariably line the curbs in the vicinity of hotels, clubs, and theaters. The pipe is of proper length to span a car and reach the edge of a sidewalk. Coupled to its outer end is a hose that carries a fan-shaped nozzle. This is handled by a street cleaner who flushes the walk as the tank car proceeds along the pavement. When the attachment is not in use, the hose is disconnected and the extension pipe swung against one side of the machine and locked, so that it will not interfere with flushing the remainder of the street.



Cleaning a Dusty Sidewalk While Motor Cars Stand at the Curb Line: The Insert Shows How the Extension Pipe is Swung against One Side of the Tank and Locked When Not in Use

FUEL STATION FOR AUTOS HAS TURNTABLE

Because a gasoline station for automobiles is situated in a small area in

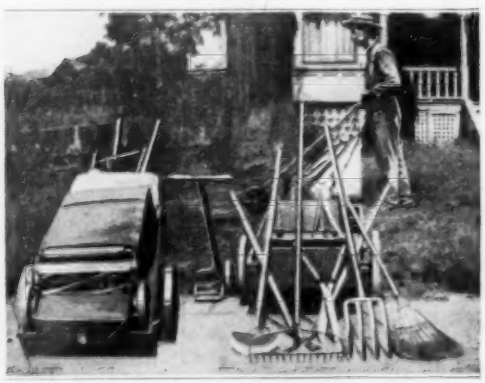


In the Foreground Is an Electrically Operated Turntable Located in a Confined Area Adjoining a Gasoline Station and Used to Turn Patrons' Cars Around

which it is difficult for cars to turn around, the proprietor has installed a turntable for the convenience of patrons. An electric switch, operated by an attendant, sets the motor-driven platform revolving when cars are driven on it.

GRASS-CUTTING SPECIALIST HAS ELABORATE OUTFIT

In a city where the climatic conditions enable him to pursue his trade the year around there is an itinerant caretaker of lawns who transports his tools in a pushcart especially designed for the purpose. The vehicle is small and its load compactly arranged, so that trips from one job to another are made easily. It is interesting to observe the variety of equipment used by this grass-cutting specialist. In addition to a lawn mower and trimming machine, he carries a sod cutter, spading fork, rake, a saw for trimming trees, a chisel and scraper for smoothing their bark, a sickle, hedge shears, pruning shears, grass shears, pliers, screwdrivers, files, an oilcan, and tools for adjusting the mowing machines.



Elaborate Collection of Lawn-Trimming Implements Used by an Itinerant Grass Cutter

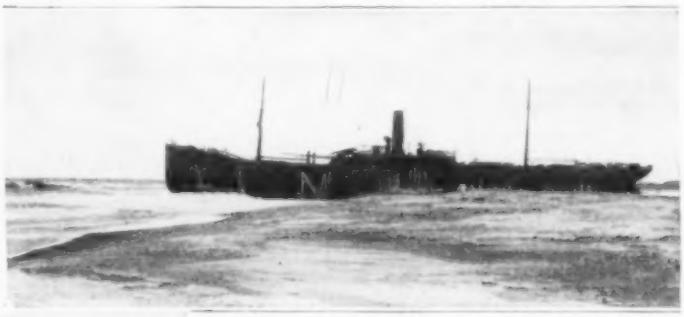
JACKSCREW DESIGNED ON NEW LINES

Greater durability and ease of operation are features claimed for a new type of jackscrew which is made by a concern in Middletown, N. Y. The ram of this tool is subject to less wear than those of ordinary jacks because it has a solid head and does not turn in its base. Raising and lowering of the ram is accomplished by turning a nut situated at the top of the standard. The nut is of casehardened steel and its outer surface is cogged so that it can be turned by a special lever having a hooked end. This method of operation permits the use of the jack in a space where only a twentieth of a turn can be made with the lever. Other advantages are that the lever does not rise with the ram as the latter is unscrewed, nor can the ram be accidentally screwed out of the base.

FLOAT SHIP LONG STRANDED ON TROPIC SANDS

After nearly ten years' captivity on the hot sands of the Guatemalan coast at Ocos, where it had been tossed dura typhoon, the German steamship "Sesostris" has been floated and taken to Seattle for overhauling. As the "Frances L. Skinner," it will henceforth be an American merchantman and an active memorial of a difficult,

if not extraordinary, salvaging feat. An unsuccessful attempt or two had previously been made to release the ship, but about a year ago the shortage of bottoms so increased its potential value that the task was again undertaken and carried, this time, to profitable conclusion. The boat is 380 ft. in length and has a cargo capacity of 7,000 tons dead weight. Its place on the beach at Ocos was some 300 yards from the ocean. There it served for a time as an electric-light plant and later as a summer hotel. When the final attempt at salvaging was undertaken, the sand was pumped from about the vessel and a small artificial lagoon formed. The bow was pointed seaward and a canal cut to deep water. Because of a heavy surf that kept the sand constantly in motion, it was necessary to construct a breakwater to protect the slip. Earthquakes contributed further trouble. Reliance had to be placed upon the tides, and on only three days of the month were they suitable. Thus it became necessary, after making some headway toward deep water, to hold the boat in the position gained for a whole month until the tides again offered their assistance. Examination at Seattle showed the vessel to be in splendid condition.

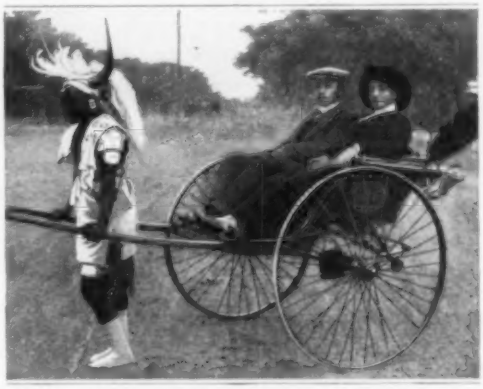


With a Tug Alongside, the Long-Stranded "Sesostris" being Towed through the Narrow Canal to Deep Water

By Dredging the Sand from around It, an Artificial Lake of Sufficient Depth to Float the Vessel was Established on the Beach

TAXI DRIVER'S SUBSTITUTE HAS STARTLING COSTUME

In the city of Durban, Natal, South Africa, the rickshaws, which to a certain extent take the place of taxicabs,



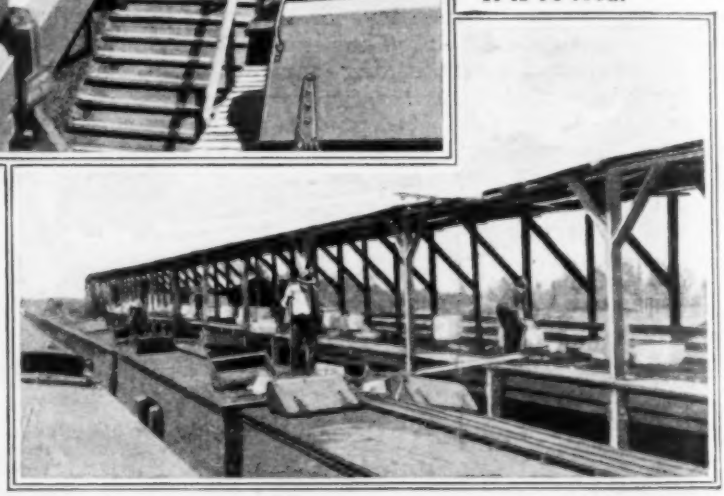
The Primitive and the Modern Contrasted in Durban, South Africa: Europeans being Drawn in a Rickshaw by a Costumed Native

are given a picturesqueness which no motor vehicles could ever possess, by reason of the costume worn by the natives who draw the two-wheeled carts. The rickshaws themselves are of quite modern construction, with wire wheels and rubber tires, but the native attendants are decked out in a garb which is a strange combination of festooned shirt, ornamented jacket, and headgear that is truly startling. The latter consists of two large horns projecting from either side of the head, together with feathers that protrude in front and long plumes that hang down the back.

ICING REFRIGERATOR CARS IN CALIFORNIA DESERT

During the melon season in southern California, for a period of several weeks, approximately 150 refrigerator cars are iced daily at Brawley, a small station in the reclaimed desert region. This is one of the hottest points in North America and every facility for icing the cars expeditiously so as to minimize the shrinkage as much as possible is employed. The ice is shipped from Colton, 150 miles distant, and unloaded onto a conveyor belt which carries the large cakes to a working platform elevated slightly higher than the tops of the refrigerator cars. Runways extend from the edge of the platform to the bunker openings at each end of the cars. As the cakes reach these planks they are pushed off the conveyor and slid to men stationed on the cars, who halve them with a single stroke of a sharp fork. They are then shoved into the holes through which they drop to the ice compartments below. Usually a car is given about 11,000 lb. of ice before being loaded. When ready for shipment it is re-iced.

Some 150 Refrigerator Cars are Iced Daily during the Shipping Season at This Station. The Ice Is Unloaded on the Conveyor and Carried to the Platform above the Fruit Cars



As the Conveyor Shoots the Big Cakes of Ice Along, Men with Long Spears Shove Them onto Runways Leading to the Icing Holes at Opposite Ends of the Cars through Which They are Dropped to the Bunkers. During a Normal Melon Season about 20,000 Tons of Ice are Used at This One Station

CONTRACTOR SAVES MONEY BY DREDGING FOR SAND

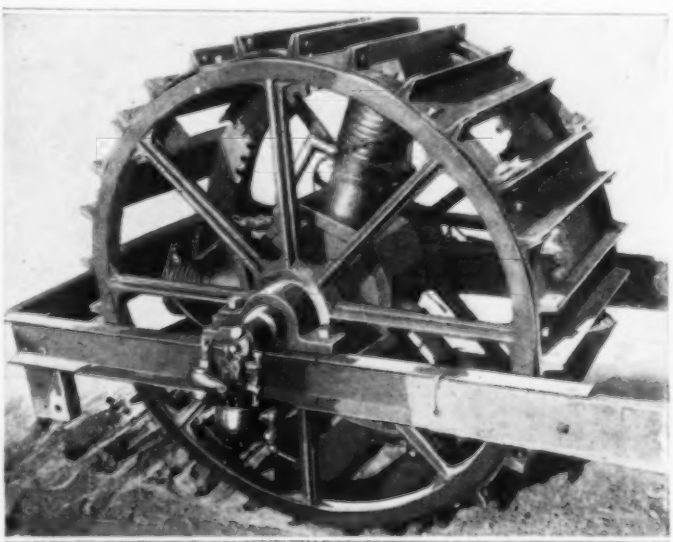
For a number of years contractors in and near Boston, have obtained sand of a very fine quality for mason work from an island located at the mouth of the Merrimac River, paying for it a stated price and hiring men to carry it in wheelbarrows aboard sand schooners stationed close by. Recently, however, a skipper greatly lessened the cost of securing the material for his firm by anchoring his vessel close to the island and dredging up sand of the same quality just off shore. In this way he was able to load overnight, whereas, in the past, loading had been

Getting Sand at Low Cost: Dredger Entering River to Load Up with Sand from the River Bottom, Which Formerly was Purchased on a Near-By Island and Carried Aboard in Wheelbarrows

a matter of days. Incidentally the quicker and less expensive method helps keep clear a channel which has been more or less menaced by sand bars.

SMALL FARM TRACTOR HAS ROTARY ENGINE

A farm tractor having a single wide drive wheel, within which is a rotary engine that develops 12 hp., has lately been patented. The drive wheel is made of two cast-iron wheels, set some distance apart and connected by a series of channel irons bolted to their rims. This enables the machine to travel over soft ground. The aim of the inventor has been to produce an inexpensive tractor having few and simple parts. The engine has three cylinders set radially around the axle, which is hollow and stationary. To the single crank in the axle all of the piston rods are attached. The combustion chambers are situated at the outer ends of the cylinders and the inner end of each cylinder constitutes a compression chamber. Gas passes from the carburetor, at the end of the axle, into the air-tight crank case, and thence into a compression chamber. The operation of valves and the piston adjoining the filled chamber forces the gas, at low pressure, into the combustion chamber of the adjoining cylinder. The engine makes 300 to 400 revolutions per minute.

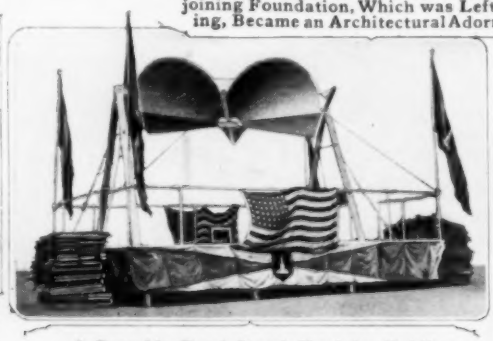


Novel 12-Horsepower Farm Tractor Driven by a Rotary Engine and Designed for Use on Small Farms

CIVIC FEATURES THAT PROMOTE THE COMFORT

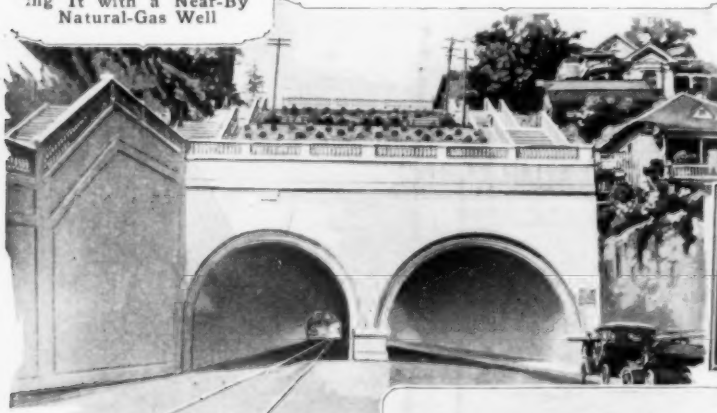
Ruins of a Fire Become an Ornament: When the High School at Fullerton, California, Burned, the Old School Ground was Abandoned for a Larger One and the Ruin Was an Eyesore Until Some One Suggested Using the Ground for a Much-Needed Park. After Clearing Away the Débris the Old School Entrance and Adjoining Foundation, Which was Left Standing, Became an Architectural Adornment

When Ashland, Oregon, Set Up This Powerful Fire Whistle in Place of a Fire Bell, Reliable Pressure was Secured for the Whistle by Connecting It with a Near-By Natural-Gas Well

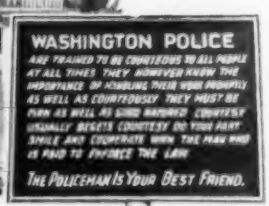


A Portable Band Stand Used for Public Concerts by the City of Baltimore: This Platform is Mounted on a Truck and Folds Up so That It can be Easily Moved About. A Special Feature Is the Folding Sounding Board Composed of Several Shell-Like Sections That can be Packed into Small Space

Depositing a Cent in One Side of a New Los Angeles Fountain to Obtain a Drink of Ice Water: The Other Side Supplies City Water Free



City Authorities Work a Striking Transformation: The Scarred Unsightly Hillside above the Mouth of Hill Street Tunnel, Los Angeles, under the Direction of the Park Commission has been Changed into This Beautiful Terraced Garden, Bordered by Artistic Flights of Steps and Balustrades



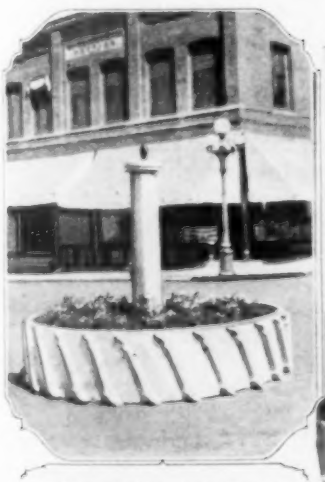
In the City of Washington the Police are Acting on the Principle That in a Democracy It Is Every Citizen's Duty Not Only to be Orderly Himself but Also to Aid the Officers of the Law When He Can. Hence the Unusual Signs, Two of Which are Shown, have been Erected at Many Points

These Massive Columns of Rough Stone, 30 Feet High and 12 Feet Thick, Form an Impressive Gateway for Denver's Mountain Parks. They are Situated at the Foot of Lookout Mountain and Bear Bronze Plates Stating That They were Given to the City in 1917 by a Local Business Man

U.S. MAIL
Home Coming Week
JULY 1-2-3-4
Send A Letter Or Card To All
Your Relatives And Old Friends
TO COME HOME AND WELD
THE HOME TIES STRONGER

When San Jose, California, Prepared for Home-Coming Week, Folks Say It Required This Big Mail Box to Hold All the Invitations That Went "Back East." At Any Rate It Was a Successful "Ad"

In Providing These Sheltered Fireplaces—of Which There Are Four, with Their Flues in the One Chimney—Pueblo, Colorado, Safeguards Beautiful Fairmont Park against Forest Fires and Makes the Preparation of Meals Easy for Motorists. Each Fireplace Has a Removable Sheet-Iron Cover and Also a Grate. Pine Fuel is Furnished Free



A New and Artistic Use for a Tractor Bull Wheel: With Its Spokes Removed It Serves as a Border for a Flower Bed at a Street Intersection in Glenwood, Minnesota. A Red Warning Light Surmounts the Center Post

This Landmark, Known as Eagle Gate, at the Entrance of What Was Once Brigham Young's Private Grounds in Salt Lake City, has been Taken Over by That Municipality and will be Kept Up by It. The Bronze Eagle Rests on a Beehive, the State's Emblem. The Original Sandstone Pillars have been Replaced by Concrete

AWNING SHIELDS RADIATOR FROM DESERT SUN

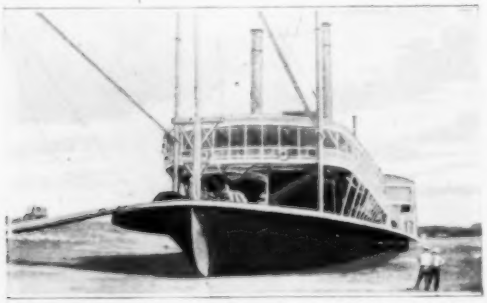
An awning stretched over the engine hood was the unusual device employed

Prepared to Cross the Desert: An Awning Stretched above the Engine Hood to Shield the Radiator from the Direct Rays of the Sun and so Lessen Evaporation

by a motorist to protect the radiator of his car from the sun's hot rays while driving across a desert, and so in a measure conserve the water in the radiator. The shelter was made of material that reflected most of the heat, and therefore prevented the metal beneath from absorbing it.

GOOD SHIP "KATE ADAMS" LEFT FAR FROM WATER

One of the best known of the Mississippi River steamers is stranded high and dry at Helena, Ark. The vessel, the "Kate Adams," put into port late in July while the level of the swollen river was falling at a rate of an inch and a half an hour. It was made fast close to the shore,



The "Kate Adams," One of the Well-Known Mississippi River Steamers, Stranded Far from Water in Arkansas

which slopes gently, and part of its cargo unloaded. After about three hours when all was ready to weigh anchor, it was found that the ship was fast in the mud. As the waters continued to recede, the fate of the "Kate Adams" was sealed. The steamer is now 175 ft. from the water's edge.

GREAT VALUE OF FARM WOOD LOTS SHOWN

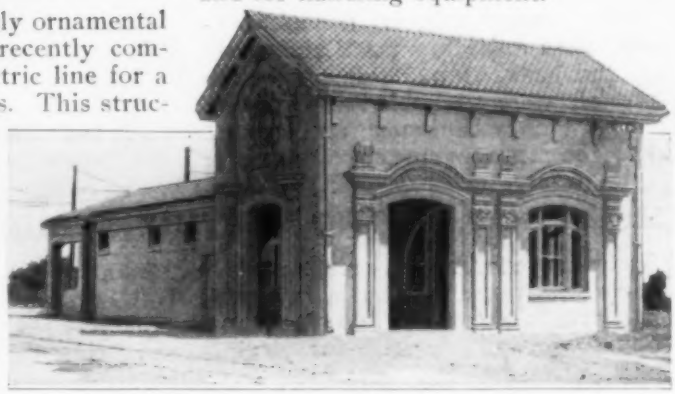
Community ownership of woodlands is suggested by the Forest Service as one means of insuring annual supplies of timber for local consumption. In pointing out the various uses of the farmer's wood lot, the statement is made that some 60 cities in this country already own wooded land, while in Europe many communities find their publicly owned forests a profitable investment. Zurich, Switzerland, derives about $20,000 per year from a wood lot of 2,500 acres, it is stated.

But for the individual farmer, also, a timbered tract is more serviceable and profitable than many suppose. In 1909, the farmers of the eastern states received from the sale of their wood-lot products an average of $81 for each reporting farm, or nearly $170,000,000 in all. In that year there were over 143,000,000 acres of farm woodland in the eastern and central states. Because it is a convenient source of firewood and other material, the chief direct value of the wood lot is to the local community. Much of the material that is sold is consumed in the neighborhood, and many small veneer, cooperage, and other plants obtain their entire supply from local sources. In view of the facts which the Forest Service has brought out, it is evident that well-settled rural communities should seek to develop wood lots and so protect themselves from future timber scarcity and correspondingly high prices.

¶A simple and exceptionally efficient high-vacuum pump, recently developed by the Bureau of Standards, can be built entirely of glass by a fairly skillful glass blower. It requires for its operation only a Bunsen burner and a water aspirator.

ORNAMENTAL STATION FOR SMALL CITY

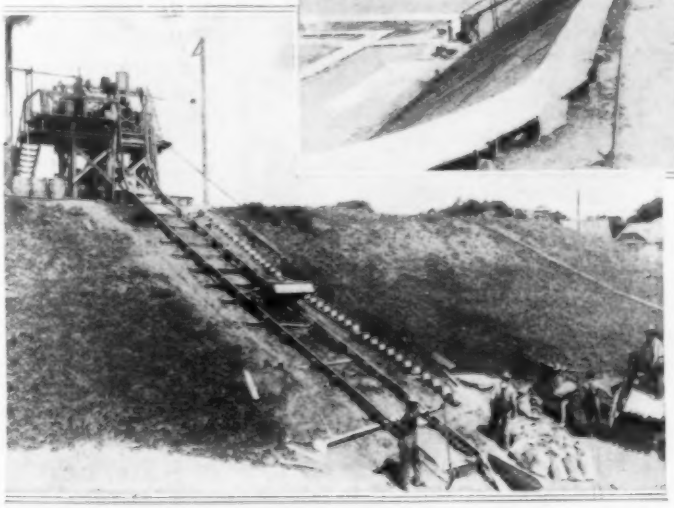
A fine example of a truly ornamental railway station is that recently completed by a western electric line for a small city which it serves. This structure is tile-roofed and is finished in light stucco with embellished doorways and windows that are slightly arched. The main part of the building contains what is designated as indoor and outdoor waiting rooms, the latter having three wide openings for which no means of closing is provided. At the rear is a wing for express, baggage, and for handling equipment.



Handsome Station Recently Built by an Electric Line: The Wide Doorways Lead to One of Two Waiting Rooms, Which Is Really a Partly Inclosed Porch

LEAKY RESERVOIR RELINED WITH CONCRETE

When the city engineers of Omaha, Neb., discovered recently that a big double reservoir at Walnut Hill was leaking badly, the city decided to reline both basins with an additional 4-in. covering of reinforced concrete. Although no trace of any water outlet could be found, there was danger that an embankment protecting a residence section might give way and cause much damage. When the water was let out of the first basin, it was found that the old concrete had cracked in several places, so the relining was timely. The problem of laying the new concrete on steel rods on the huge floor and sloping side walls of

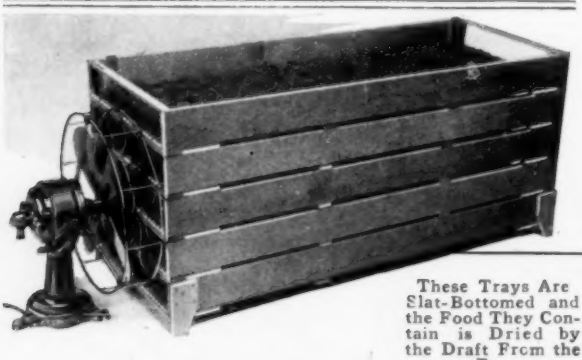


Making a Leaky Reservoir Water-Tight by Relining with Concrete: The Inclined Track and Skip to Convey Materials to the Mixer Above are Shown at the Left, While the Method of Distributing the Concrete Inside the Basin is Seen Above

the large basin was solved by a local engineer, who devised a plan and apparatus whereby a mixing machine was installed on top of the embankment, with a feeding track and chute into the basin at one side, while the materials were assembled at the other side of the embankment and carried up to the mixer by means of skips on an inclined track. When mixed, the concrete was delivered through the chute to men with wheelbarrows at the bottom of the inside slope, who distributed it over the wide spaces to be relined, where the reinforcing steel rods were previously placed. In this way both the reservoir basins were once more made water-tight.

IMPROVED DRYING METHODS FOR FOOD SAVERS

Extra-large fruit and vegetable crops in these war times, coupled with a serious shortage of cans, have brought out many improved devices for drying foods. One of the simple and serviceable outfits consists of several trays, open at the ends and provided with slatted bottoms, which when filled with properly prepared food are piled one above the other. The contents of the trays are dried rapidly by placing an electric fan at one end and forcing air among them. This is one of the methods recommended by the government for town and city people especially. Another consists in drying on the traylike top of a galvanized-iron container filled with water, which is set above a blaze. Steam from the boiling water heats the tray so that the food spread out on it rapidly loses its moisture and at the same time there is no danger of burning it. Evaporators are built on the same principle which have three or four trays heated by steam from a single tank.



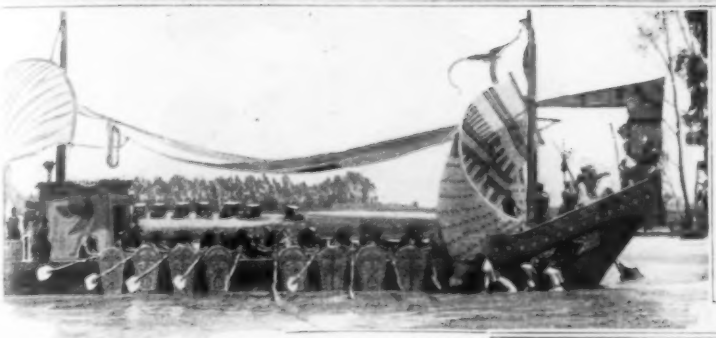
These Trays Are Slat-Bottomed and the Food They Contain is Dried by the Draft From the Fan

A machine especially adapted for large-scale operation, removes the moisture from fruit, vegetables, meat, or fish by forcing gases from burning oil over the food. The heat derived from this method also assists in the drying. The machine is provided with an electric fan which blows the gases given off from burning oil through a blast pipe over a set of trays. The theory on which the outfit is constructed is that certain elements in these gases attract the moisture in the food and so effect quick, thorough drying without imparting any foreign flavor to the food.

A Drying Tray Kept Hot by Boiling Water Contained in the Chamber Beneath

An Evaporator Which Removes Moisture from Food by Forcing Gases from Burning Oil over It

EGYPTIAN SCENES FILMED DESPITE OBSTACLES



Above: The Barge at the Dock in "Alexandria". This View Gives Some Idea of the Extent of the Settings That had to be Built

Below: Pumping Water to Float Cleopatra's Barge; the End of the Slough Whose Level was Raised by Artificial Means

Back-Side View of the Barge, Showing the Men in the Water Who were Needed to Aid in Controlling the Boat, Which Proved Almost Unmanageable

The story of how the splendor of ancient Egypt and of Cleopatra's court were reproduced for a new motion-picture film illustrates the fact that many difficulties which movie producers encounter can only be overcome by ingenuity and lavish expenditure. For the purpose of showing the queen's famous voyage from Alexandria to Tarsus, a large slough was selected as a setting and dammed with a bank of earth. Water was pumped into it day and night to maintain the desired level. On the shore, false fronts were erected which reproduced with remarkable detail the architecture and appearance of the Egyptian port. After pictures had been taken of the queen's departure in her royal barge, the setting was completely altered to show her arrival at Tarsus. Two weeks were consumed in making these changes.

Peculiar difficulties were also encountered in handling the huge barge. While outwardly resembling the ancient craft, it was, in reality, supported in the water on barrels and, because of its large, gorgeous sails and draperies, proved almost unmanageable in the wind. To supplement the oarsmen a large crew was stationed beside the boat to push it along, wading waist-deep in the water. In every view they had to be stationed out of sight, on the side away from the camera. Fortunately a great variety of types were available for the extra parts, which are said to have numbered 20,000. Powerful Negroes posed as slaves, Mexicans as Egyptians, and fair-haired Americans as Romans—all attired in costumes that were historically correct.

LIGHTNING STRIKES CHURCH AND STRIPS TOWER

When lightning struck a church in a small town some time ago, it shaved practically every shingle from the steeple and peeled most of the brick veneer from the tower walls without materially damaging the wooden framework beneath. At the same time some 200 window panes within a radius of about 1,000 ft. of the meeting house were forced out of their frames by the air disturbance created. Most of these were of double-strength glass, and some were heavy plate, indicating that the stroke which produced this freakish result was one of unusual violence.

A Stroke of Lightning Divested the Spire of This Church of Its Shingles and Most of the Brick Veneer of the Tower Walls without Hurting the Framework

WHAT IT COSTS TO EQUIP EACH INFANTRYMAN

A detail which throws interesting light on the war's colossal cost is found in the statement that our government spends approximately $156 in equipping every infantryman for service in France. A little calculation will show what it will cost to prepare a million or a million and a half men for the front. The equipment expenditures for the foot soldier are classified under three heads: clothing, eating utensils, and fighting equipment. Under the latter group the rifle, the cost of which is figured at $19.50, is the most expensive item. This amount varies from time to time. The gas mask, which also varies in price somewhat, is estimated at $12, and 100 cartridges at $5. The total cost of the clothing is slightly over $100, the biggest items being $18.75 for three wool blankets, $14.92 for one overcoat, $15.20 for two wool service coats, and $10.20 for two pairs of shoes. In all, there are 23 different kinds of articles listed under clothing. In the eating-utensil group are included food to be carried in the haversack during field service, a canteen and canteen cover, cup, knife, fork, spoon, meat can, haversack, first-aid kit, and a pouch, costing approximately $7.70.

TILTING INKWELL SAVES WRITING FLUID

Waste in writing fluid is reduced to a minimum by using a new type of inkwell, provided with a container wholly inclosed, except for a funnel-shaped opening at one end, in which the pen is inserted. This form of reservoir largely prevents evaporation. The ink tank fits into a wide, low stand and is held in place by means of two pivots situated one at each side so that the well can be tilted to make available the last drop of ink. A screw at the rear end regulates the angle at which the tank can be tipped.

¶ It has been decided that Red Cross nurses with base hospitals and other military hospitals in France shall wear gray instead of white uniforms, on account of the limited laundry facilities in that country. An appropriation of $14,000 has been made for the purpose.

NOVEL DEMONSTRATION MADE OF GAS APPLIANCE

Quite an interesting laboratory test is employed to illustrate the merits of an apparatus that mixes air and gas in an exact ratio. For carrying out the demonstration, a glass bottle supplied with an asbestos washer, is clamped, neck down, to a channel iron. A burner is screwed to a gas-tight nipple that projects through a metal member. A mixture of air and fuel is supplied to the burner through a rubber tube, while a second and smaller one, fitted to a connection opening into the flask at one side of the first, is provided to carry the products of combustion into a vessel of water. When ignited, the gas burns for an indefinite period in the virtually closed chamber. This is possible only because the fuel is a self-sustaining mixture and the products of its combustion are discharged. Economy of gas and high temperature are the results of the combustion system, it is claimed, and therefore it is adapted to metal-working operations.

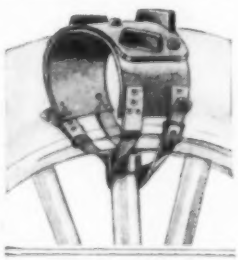
TUBES INSTEAD OF BELLS FOR TOWER CHIMES

A modern substitute for the time-honored but cumbersome bell chimes consists of sets of accurately tuned tubes or pipes, which can be easily installed in any belfry and occupy small space. Electric hammers, mounted at the upper end of the pipes, strike them with quick, sharp blows through the operation of projecting and recoiling magnets. The magnets are controlled by a simple keyboard which can be installed in any part of the building desired and which can be played by any person having a rudimentary knowledge of the piano. Chimes of this sort require so little current to operate them that it is scarcely recorded by the meter.

Tower Chimes Composed of Accurately Toned Pipes Which are Played by Means of a Keyboard with Which They are Electrically Connected

MUD HOOKS, OR CREEPERS, FOR MOTOR CARS

When a motor car is stalled in mud or traveling on heavy dirt or snow roads, a set of mud hooks, or creepers, recently brought out will, it is claimed, greatly assist progress. The creeper consists of a wide strap of heavy woven belting, carrying a cleated plate of malleable iron with three staggered calks, and riveted straps with buckles for attachment to the rear tires of a car. Each creeper is shaped to fit over a tire and is securely buckled to a spoke. The set recommended for a car consists of three for each rear tire.



SOME NOVEL AND LITTLE-KNOWN ACCESSORIES

Smooth-Fitting Inside Belting for Waists, Suits, and Dresses: It Hugs Tightly without Wrinkling and Eliminates the Necessity of Making Darts. Close View is Shown at Top of Page. Price 15 to 25 Cents a Yard

Electric Milk Warmer for the Nursery: The Bottle Fits Inside of the Heater Ring, Shown in the Middle, and the Two are Placed in the Water Vessel

Light Sulky of Attractive Design with Reclining Back and Adjustable Top: A Metal Rest Supports the Front of the Vehicle When the Tongue is Lowered

Combination Double Boiler and Teakettle Intended Both as a Fuel and Space Conserver: It is Made of Aluminum of Capacities Ranging from Two to Six Quarts. Prices $2.25 to $3.75

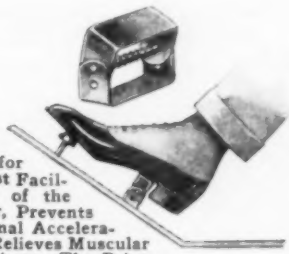
A Spring and Fall Convenience: A Detachable Screen-Door Hinge That Eliminates Considerable Work for the Householder. The Hinge is Released by Turning the Thumbscrew

Sanitary Spoon for Soda Fountains and Ice-Cream Shops Consisting of a Detachable Waxed-Paper Bowl and a Metal Handle: After Once being Used the Bowl is Destroyed

About 50 Unmounted Kodak Prints can be Carried without Injury in the Leather Case Illustrated at the Left. It is Provided in Several Sizes at Prices Ranging from $1.50 to $2.00

With Flaring Legs That Prevent It from Tipping, and a Center Strap That Keeps a Youngster from Sliding Out, This Is an Accident-Proof High Chair with a Sanitary Porcelain Food Tray

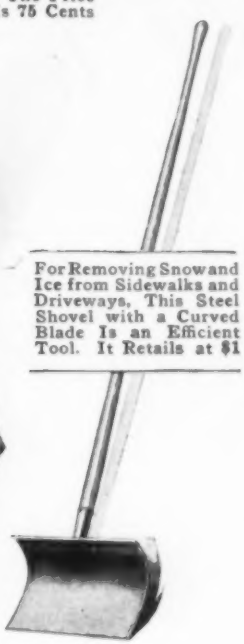
To Protect Foods Delivered during One's Absence from Home, This Receptacle has been Designed. It is Installed in a Partly Open Window and Serves Adequately as an Iceless Refrigerator during Cold Months



A Spring Foot Rest for the Motorist Facilitates Use of the Accelerator, Prevents Unintentional Acceleration, and Relieves Muscular Fatigue. The Price Is 75 Cents

Particularly Convenient for Christmas Packages and Letters: A Roll of Printed, Perforated, and Gummed Stamps Bearing One's Name and Address to be Used as "Return Stamps." Price $2.25

Especially Suited for the Back Porch of a City Apartment Is This Waste-Paper Bag Which is Supported by a Steel Frame Attached to the Wall and Fitted with a Metal Cover. Price $5



For Removing Snow and Ice from Sidewalks and Driveways, This Steel Shovel with a Curved Blade Is an Efficient Tool. It Retails at $1

For the Woman Who Occasionally Uses a Hammer, Sometimes with Disastrous Results, This Nail Holder has been Devised

Showing Interior Construction of Compact Gas Furnace Intended Especially for Residences Situated in Regions Where Moderate Temperatures Prevail the Year Around: It will Warm a Chilly or Damp House in a Few Minutes and is Easily Regulated. Small Size. About $100

Convenient for Milking Is This Pail, Which is Fitted with Curved Supports That Rest across One's Legs and Hold the Receptacle in Position

CHEST DEVELOPER TELLS CAPACITY OF LUNGS

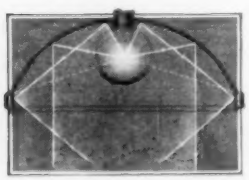
Excellent chest development, and incidentally much entertainment, can be obtained by using a simple lung exer-

Simple Lung Exerciser: As This Bag is Inflated the Indicator Attached to the Side Slides toward the End of the Graduated Ribbon. By This Means One's Lung Capacity is Accurately Measured

ciser consisting of a rubber bag fitted with a device to measure its inflation. Special benefit is derived by trying to make the bag as large as possible with a single breath. Attached to the side of the valve through which one blows is a ribbon having graduated markings. This measure passes through a slotted guide fastened to the side of the bag, and as the latter expands, the guide slides farther and farther toward the ribbon's end. The reading indicated by the position of the guide shows the number of cubic inches of air in the bag.

NONGLARE AUTO LIGHT WITH SOLID BEAM

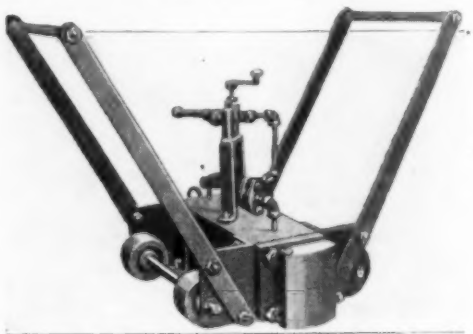
An improved form of reflector for automobile and other spot lights, recently patented, is claimed to produce a nonglare beam without any dark center and effective at all required distances. The new light has a 6-in. reflecting surface, and is provided with a 21-cp. nitrogen bulb.



A cap deflects the direct light of the bulb to the reflecting surfaces in such a way that most of the light is thrown out directly in a parallel beam and the rest is reflected into it. The resulting beam is said to conform fully to all city ordinances and state laws, since only reflected rays are projected and no direct light from the bulb can enter the eyes of approaching drivers or pedestrians.

SHIPBUILDING TOOL BENDS HEAVY STEEL MEMBERS

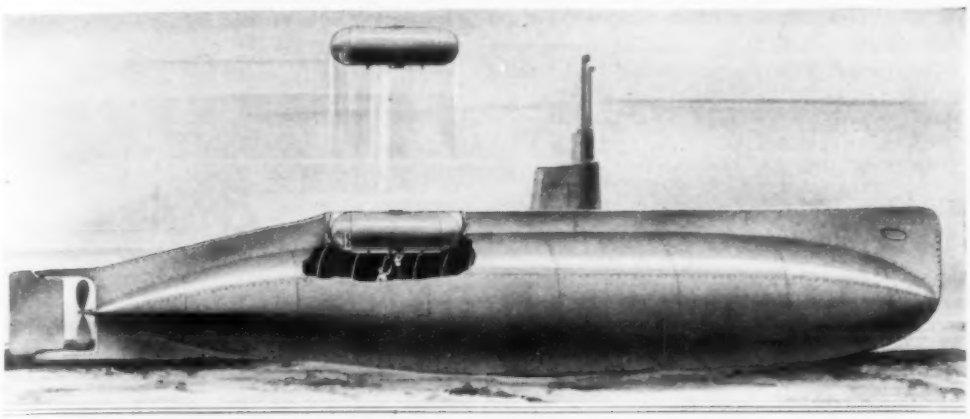
For shaping heavy steel used in shipbuilding, a compact and comparatively light machine has been developed which is claimed to bend long members to template with minimum labor and without requiring the material to be reheated. It consists essentially of a cylinder, a double-acting ram, and an operating mechanism



Powerful Shipbuilding Tool That Minimizes Labor of Bending Steel for Frames and Deck Beams: It Develops a Working Pressure of 20 Tons

so mounted on broad rollers that it may be rolled by pushing or pulling on handles provided at either end. A loose pin fits in holes in the bending slabs and serves as an abutment for the apparatus. Power may be supplied by pump or accumulator service. At a pressure of 1,750 lb. to the square inch, the machine with a 10-in. stroke develops a working power of 20 tons. Although it is powerful, the machine is fairly compact and not excessively heavy. In operation it is easily handled by ordinary workmen.

BABY SUBMERSIBLE AS SUBMARINE'S LIFEBOAT



The Method of Carrying the Auxiliary Submersible and the Way It Leaves the Mother Craft are Shown in the Drawing Above. The Small Vessel is Self-Propelled and Accommodates 30 Persons

For a long time attempts have been made to evolve some sensible scheme for permitting a crew to escape when a submarine sinks, gets ensnared in a net, or for some reason becomes unmanageable while under water. In line with this work is an invention that has lately been protected by patents. It is a lifeboat and, in reality, a small auxiliary submarine that normally is held in a concave seat constructed in the top part of the large craft. Watertight hatchways are provided in each of the vessels so that access from one to the other of them is possible. As designed, the small craft is 26 ft. in length and 6 ft. in diameter. It is intended to offer a safe retreat for some 30 persons. Electric and gasoline motors would propel it and give it a radius of action estimated at about 500 miles. In the event of accident, members of the crew would enter the lifeboat, close the hatchways, free the small craft by unscrewing two large bolts that anchor it to the larger one, and rise to the surface. The inventor claims that existing submersibles could be equipped with the device, but in new ones it would be an integral part of the vessel.

CURRENT METER FOR USE IN HARBOR WATERS

A Cornell professor has invented an efficient current meter for securing data regarding the flow of water beneath the surface in harbors, and other localities where such information is valuable to mariners and chart makers. It was used recently in charting the currents set up by the mingling of fresh and salt water at the sea-level end of the Miraflores locks, Panama Canal; also by the hydrographic division of the navy in tracing the Gulf Stream around Florida, and in charting currents in New York harbor and at

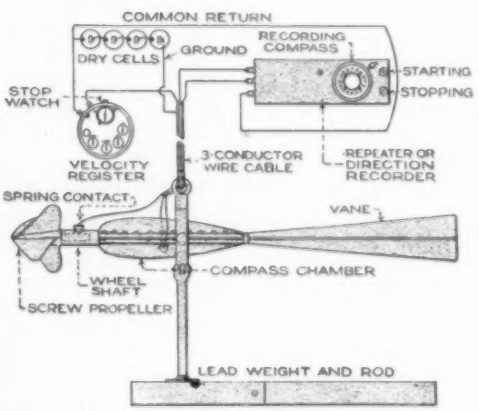


Diagram of New Current Meter Used from a Boat to Secure Data for Charts of Harbor and Coast Waters

points on the Great Lakes. The meter determines both the velocity and direction of running water below the surface, and indicates each electrically on registers. In use, part of the apparatus is suspended by an insulated and wired cable from an anchored boat in which the batteries and registers are placed. The meter box contains a compass in oil, to indicate direction of the flow at any depth to which it is lowered, and has a turbine tail vane, or wheel, whose turns indicate the velocity of the current, these data being duly registered on dials in the boat where the controlling switches are also located.

SMALL INDUSTRIAL TRACTOR HAS DOUBLE-END CONTROL

For use in warehouses, railway terminals, and similar places, an electric truck with dual control which permits operation in either direction has been introduced. The object of the arrangement is to obviate the awkward maneuvering that is often necessary when a tractor is being used in narrow aisles and passageways. Instead of turning the machine around, the driver in this case has only to change his seat, for either end serves as the front end. Two battery boxes are mounted on the truck, and the tops of these serve as seats. The large compartment contains three trays of six cells each, while the small one holds an additional set, making in all 24 fifteen-plate batteries of 220 ampere-hours' capacity. With a 20,000-lb. load the tractor will push or pull its trailer trucks at a maximum speed of seven miles an hour.

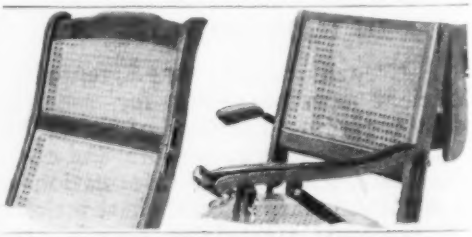
Two Pedals and Handles Control the Machine and may be Manipulated from Either Seat. The Arrangement Eliminates Much Needless Turning

MAGAZINE FEEDS NEEDLES TO PHONOGRAPH

A magazine with a capacity for a number of talking-machine needles has been patented, which attaches to the sound box of a phonograph and is so made that the steel points can be fed into position one after another as needed, with a minimum of inconvenience. The chamber consists of a slender tube, at the lower end of which is a chuck, by means of which the needle projecting from the end is held in position for use. The other needles are kept from pressing down against the bottom one by a spring that projects through the side of the magazine and can be withdrawn when the operator wants a new needle dropped into place.

HINGED BACK A FEATURE OF HOSPITAL CHAIR

A chair for convalescents or invalids, which will doubtless find much service in army hospitals, and elsewhere, is provided with a high back, the upper portion of which is a hinged section that can be let down when desired.



Two Views of Hinged Back of Chair for Convalescents or Invalids: The Occupant's Hair can be Dressed or Head Bandages Adjusted Much More Easily with the Hinged Section Let Down

This permits the occupant to move his head more freely, and in case the hair is to be dressed or bandages are to be adjusted, it is then, also, a special convenience.

COMBINED MEMO HOLDER AND PHONE INDEX

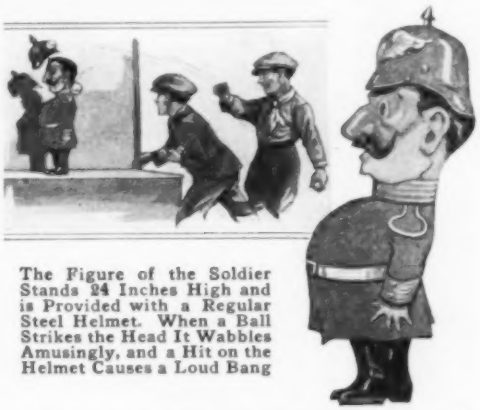
A very convenient attachment for a desk telephone consists of a combined memorandum-pad holder and an index which is attached by a clamp to the instrument post. A spring-held clip keeps loose leaves or a pad in place on the metal surface of the holder. The latter can be turned out of the way when desired, giving access to the index beneath. Entries can be made on both sides of the index leaves, giving it a capacity for 456 names.

STAND FOR WRAPPING POTTED PLANTS

A new invention which will prove a special convenience for florists is a small circular-topped stand for use in wrapping potted plants. About this support are nested a number of paper wrappings, cylindrical in form. After a plant to be prepared for delivery has been placed on the stand, one of the wrappings is drawn up about it and tied at the top, and also at the bottom if desired. Interchangeable tops of various sizes, with wrappings to correspond, can be provided. The framework of the stand is of ornamental iron. The upper section can be locked in an upright position.

PRUSSIAN SOLDIER GETS KNOCKS IN NEW GAME

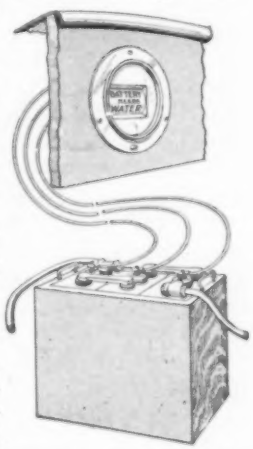
One of the new games which has been brought out since this country entered the war is a suggestive variation of the familiar "hit the doll baby" game. In the place of a carefully balanced doll is a 24-in. figure of a Prussian soldier with a life-sized head on which is a regular steel helmet. Balls are thrown at the figure and those which strike the head cause it to wabble amusingly.



The Figure of the Soldier Stands 24 Inches High and is Provided with a Regular Steel Helmet. When a Ball Strikes the Head It Wabbles Amusingly, and a Hit on the Helmet Causes a Loud Bang

DIAL SHOWS WHEN BATTERY NEEDS WATER

An instrument recently invented by a garageman indicates by its dial on the dashboard when the storage battery of an automobile needs water through evaporation or leakage of the electrolyte in any of its cells. The dial is that of a voltmeter installed on the dash and connected to the battery by wires forming a closed circuit. When the fluid in the battery reaches a dangerously low level, the warning signal appears behind the glass of the dial.



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No Soft Blows in This Sport: These Japanese Schoolboys are Armed for a Fencing Game Rougher Than Football and as Popular

At 14, Theodore Coleman of Mt. Carmel, Illinois, Is a Movie-Theater Manager! This Is Part of One of His Audiences, Which Are Almost Always Overflowing

Just to Show That Royal Children Are Quite Human, Here Is Princess Juliana of Holland, Who Is Eager to "Try Out" the Ice—if She Has Something to Cling To

FRENCH OFFICIAL WAR PHOTO

Now and Then There Are Days When Joy and Gratitude Drive Away Sadness in War-Worn France. This Picture was Taken on Such a Day While Kind Women were Presenting the Children of Noyon with Toys Sent from America

SHOWN IN VIEWS FROM WIDELY SCATTERED LANDS

This Is "Baldy," a Famous and Heroic Alaskan Racing Dog, Now Living in the West on a "Pension" Supplied by His Master. The Smaller Picture Shows Two Gold Collar Plates Given Him by Admirers

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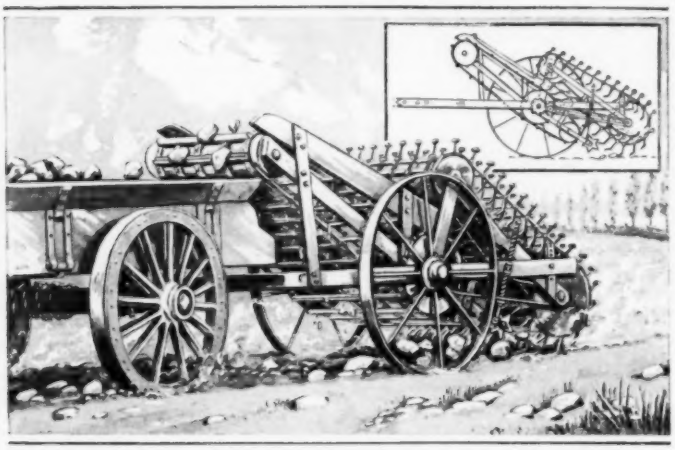
The Coming of Wintry Days Delights Barbara Livermore of New Hampshire for, Though Only Three, She Is Adept at Snowshoeing

Ordinary Coasting did Not Satisfy Joseph H. Lucci, Aged 15, of Alaska, and So He Made This Novel Motor Sled That can Travel 16 Miles an Hour

It Seems Unbelievable, but Nevertheless Many Little Boys, Some Only Eight Years Old, Belong to the Crew of the Mexican Gunboat "Guerrero" That Visited San Diego, California, Recently. Several in This Picture have Shared in Bloody Battles

STONE-GATHERING MACHINE DEVISED FOR FARM USE

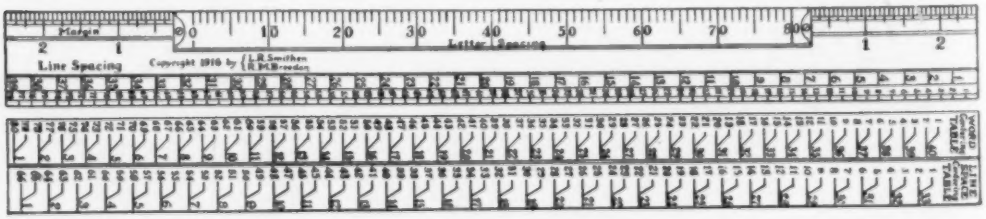
To eliminate the tedious work connected with the removal of loose stones from farm lands, an operation that is ordinarily done by hand labor, a Wisconsin man has invented a machine for accomplishing the work. It is of simple construction and easily handled by a strong team. When in use the apparatus is attached to the rear of a wagon, into which it loads the stones as they are gathered. It is obvious that no mechanical device could differentiate between stones and hard clods, so provision has been made for crushing the latter and allowing the dirt to fall to the ground. The outfit consists in part of a framework that supports a conveyor, onto which the stones are delivered by parallel rows of rake bars, carried on endless chains. The device is supported on a pair of large wheels from which power for operating the mechanism is obtained. The value of such a machine will be apparent to all who are familiar with the difficulties encountered in cultivating stony land.



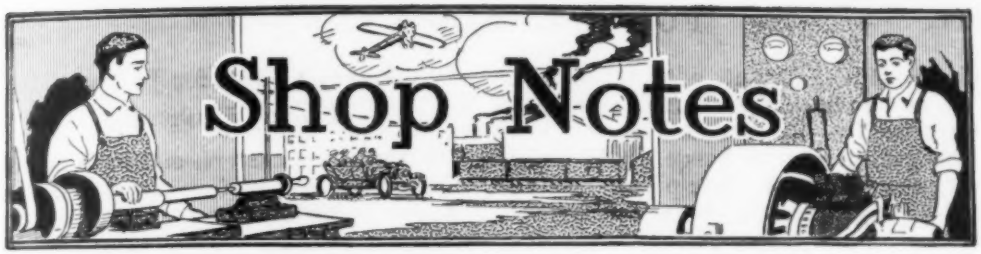
The Rows of Rake Bars Gather the Stones and Place Them on the Conveyor Which Discharges into the Wagon. Hard Clods are Crushed and Thus Separated from Stones

SCALE RULER TO MEASURE TYPEWRITING

With a scale ruler lately placed on the market by a Los Angeles firm, typewritten work may be accurately measured as to lines, letters and spaces may be counted, columns placed, and margins located, even by those who find it difficult to use the ordinary mechanical adjustments of a typewriter. The ruler reproduces the typewriter scale and is 13 in. long, the length of legal paper. The scale reproduction is 8½ in. long, the width of typewriter paper. Either of the margin ends added to the typewriter scale makes 11 in., the length of letter paper or letterheads. The ruler is used principally for planning work to fit the paper; also to find how much matter will go on a postcard and similar areas, and to place work on a stencil. In tabulation work it can be used to determine where tabular stops are to be placed on the typewriter. It is also convenient in checking legal copy, bids, reports, and the like.



New Typewriter Scale Ruler with Which an Operator can Measure Work to be Copied, Count Lines or Letters, Center Headings, or Tabulate



Fertilizing and Irrigating a Farm with Muck from Lake Bed

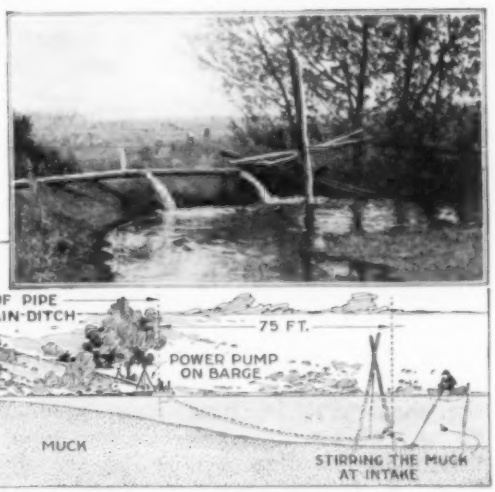
By E. R. McINTYRE

AN original and successful scheme for using lake water and its muck deposits for irrigating and fertilizing an adjoining farm was used by a Minnesota farmer. There being no complete outfits on the market for such projects, he worked out his own methods which have a wide application for similar projects. The pumping outfit transfers 90 tons of muck-laden water an hour from a small lake to the farm land. Of this solution nine tons an hour is muck. The lake has about 5 ft. of water at its deepest point. The muck is from 8 to 35 ft. deep, of loose formation, and easily pumped.

The Barge is Anchored near the Shore and Carries the Pump and Engine

The equipment consists of one 7-hp. kerosene engine, a 3½-in. centrifugal pump, intake pipe, and a pipe used to carry the water from the pump to the highest point of land whence the distribution is through open ditches and furrows. While the pump is in operation, a man in a boat about 100 ft. off shore agitates the lake bottom occasionally with a long-handled rake, to stir up the muck.

Engine and pump are fastened to a small barge, as shown in the lower photograph. Connecting with the pump are two lines of pipe. One draws the muck and water into the pump, and



General Plan of the Muck-Pumping System, and a View of the Discharge Pipes at the Main Irrigation Ditch

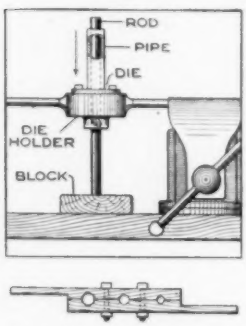
the other transfers it in turn to the land. The intake pipe of wood is kept at the bottom of the lake by means of weights. A 6-in. pipe is fastened to the wooden pipe and may be swung in various directions. With added pipe the supply of muck is readily extended.

To keep out stones and sand a special device is used. A box, measuring 3 by 3 by 5 ft., is placed between the pump and the intake pipe. This catches the extra large particles and keeps them out of the pump. The water and muck are taken to the highest point on the

farm, 650 ft. distant, with a rise of 17 ft., by two lines of 4-in. pipe. These are fastened to the exhaust openings of the pump on the barge. Old boiler flues are used for these pipes. Instead of piping outward from the highest point on the farm, ditches were dug, and the strawberry beds and orchard irrigated in this way. On kerosene, the cost of operation is about 10 cents an hour, the muck thus being deposited on the land at a cost of 10 cents a ton, exclusive of labor and repairs to machinery and the initial cost of $250 for the equipment.

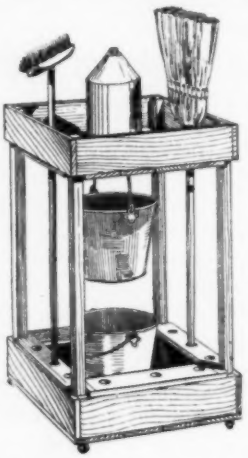
Cutting Threads Accurately on Small or Thin Pipe

In cutting threads on thin or small pipe it is often troublesome, especially on short pieces, to get the threads square with the length of the pipe. There is also trouble in getting a suitable grip on the pipe so as not to bruise or scratch it if plated. A good method is to put the die holder in a bench vise, and reverse the dies, that is, turn them upside down. This will make a piece of pipe thread in the direction of the arrow. Select a piece of steel rod of a size to just slide through the pipe. Run this down between the dies into a block so fastened as to make the rod vertical. Slide the pipe down over the rod and it will be threaded straight and true. The best grip I have found is shown in the smaller sketch. Select a piece of hard wood, 1⅛ in. thick and 15 in. long. Shape it as shown, and bore a series of holes along a center line, of sizes to take the outside diameters of the pipes. Then bore two ¼-in. holes for bolts. With a thin saw, cut along between the pieces. When clamped on the pipe, this device will not slip or bruise it.—L. M. Drake, Daytona, Fla.



Portable Stand for Janitor's Cleaning Equipment

A stand, on casters, and built to accommodate the various articles that a janitor uses in cleaning rooms and halls in large buildings, is a time and labor saver. It is made to fit a hall closet, and can be kept out of sight easily when not in use. Painting it with white enamel gives a neat appearance. When needed, the janitor rolls the stand to the room he intends to clean, leaving the stand just outside. The casters should be of the pivoted roller type, and for use on highly finished floors larger, rubber-covered caster wheels are desirable.—Thomas O'Dea, New Haven, Conn.



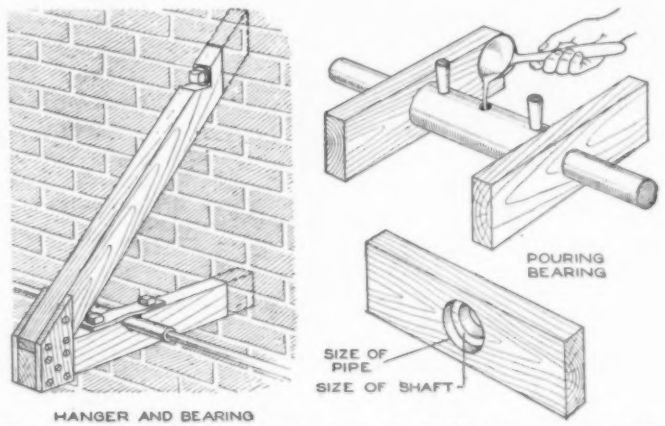
Tool for Grasping Small Machine Parts

Four pieces of steel wire and a file handle are all that is needed for the construction of a handy tool useful for setting bolts, nuts, screws, etc., in places difficult of access. It is also convenient for recovering coins, rings, washers, etc., from plumbing fittings. The tool is made by driving into the file handle three steel wires, in prong fashion. A wire is made ring-shaped, to slide over the prongs and compress them about the piece to be handled. The length of the prongs will vary to suit the needs of the individual user.

Shaft Hangers and Fittings for the Small Shop

When it was found too expensive to buy hangers for a shaft in a small shop, they were improvised, and proved so serviceable that they were left in place as permanent equipment. Six of these hangers carry a 1-in. line shaft, 34 ft. long. The method of construction is simple, and the parts used can be obtained in most small shops.

Cold-rolled steel is used for the shaft. The bearings are made of short sections of gas pipe, into which babbitt is poured. The bearings require a 1¼-in. pipe, cut from 4 to 6 in. long, depending on the load to be carried. After the pipe is cut with a hacksaw to give a square end against which collars can be fitted, the sections are bored with three holes, as shown in the sketch. Two of the holes are oil holes, and the center one is for the pouring of the babbitt.



Equipment for Power Transmission in the Small Workshop can be Made Cheaply by Using Babbitted Pipe Bearings and Hangers Built Up of Wood

The pouring of the babbitt is accomplished by means of two wooden supports, bored, as shown, to fit the shaft, and shouldered for the pipe. The arrangement is set up as indicated, the oil holes being plugged, and the babbitt is poured into the bearings. The bearings are smoothed and cleaned in the usual manner. If the shaft and pipe are warmed slightly, a better job will result.

The method of hanging the bearings can be arranged to suit conditions. In this instance the shaft is run along the wall, and the hangers are made of wood, strongly braced, and set into the wall, as shown. The bearing is clamped into a V-groove by means of a metal plate.

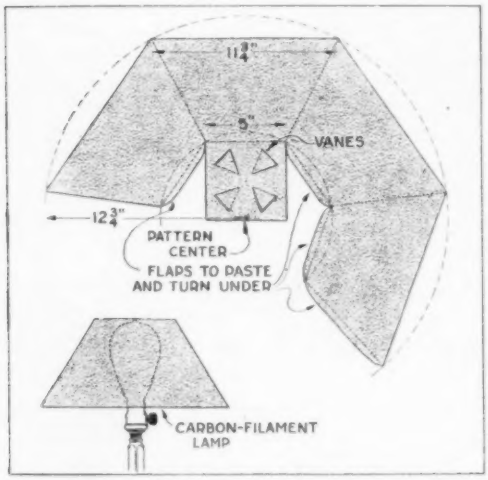
The wood pulleys to transmit the power from the shaft are made by building them up of alternate layers of ⅞-in. wood, which are cross-banded, and fastened with glue and bolts. The pulleys can be turned true by mounting them on the shaft, and rigging up a suitable rest for the turning chisels. Collars for holding the pulleys and other fittings on the shaft, can be made up of short sections of pipe, drilled and tapped for setscrews. To guard the setscrews, they should be short, and the threaded collar covered with a second collar, bored so that the head of the setscrew is recessed in a socket, and the covering collar cut to form a split ring. Suitable setscrews may be made by cutting off the threaded end of a bolt, and slotting the upper end to engage a heavy screwdriver.—Ray F. Kuns, Cincinnati, Ohio.

Small Wire Scratchbrush Handy in Soldering

In soldering teakettles, pans, etc., it is often difficult to clean the surface to be soldered, especially on the inside of the vessel. This trouble can be overcome by using a file cleaner with long steel-wire bristles. If the cleaner is too large, cut some fine steel wires, form them around a small brass rod, bind them securely with a piece of brass or copper wire, and then sweat a little solder in around them. Such a scratchbrush will give good service for cleaning small areas.—A. Gemmell, Ansonia, Conn.

Window Lamp with Revolving Shade Attracts Attention

The animated window display described is automatic and requires no driving mechanism. To make the revolving shade, cut from light, strong cardboard, a form, as shown. The sides may be cut with stenciled letters or designs, backed with translucent paper, or may be left solid. Four triangles are cut in the top, and the resulting vanes are bent downward at right angles. A small paper disk is then pasted in the exact center of the under side of the top, and a small hole centered in it. Mount a large carbon-filament lamp on a suitable pedestal, pivot the shade on the tip of the lamp, and turn on the current. The heat generated will flow up between the vanes and slowly turn the shade as long as the current is turned on.—B. L. Dobbins, Boston, Mass.



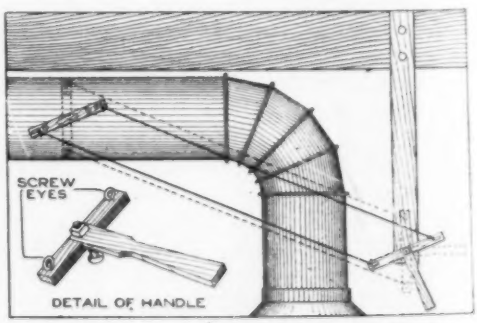
The Heat Generated by the Lamp Turns the Shade, Which is Pivoted on the Tip of the Globe

Cutting Hard Sheet Rubber with Scissors

Hard sheet rubber is difficult to cut, and the average experimenter has few facilities for doing such work. An easy way to cut this material, up to 3/16 in. thick, is as follows: Mark the outline to be cut on the rubber with a scriber. Plunge the sheet into hot water; take it out and cut on the outline with a pair of heavy scissors. The rubber will become soft like leather and will cut easily. As it becomes cooler, it will cut harder. If any more cutting is to be done, plunge it into hot water again, and continue until the cutting is finished. The sheet will probably be somewhat out of flat. To remedy this, dip the rubber in hot water, place it on a sheet of plate glass, or metal, and put another sheet of glass over the rubber, with a weight on it. Permit it to cool, and it will be flattened.—W. S. Standiford, Youngstown, Ohio.

Device for Opening Stove Damper Handily

It is often inconvenient to get near enough to a damper in a stove or furnace to open and close it. To overcome this difficulty I arranged a simple device, as shown in the sketch. I first made four pieces of wood, ⅞ by ½ by 6 in., and two of them were halved together in the form of a "T," as detailed. On the ends of the crossbar I inserted screw eyes. The other two pieces I fastened on the handle of the damper with two screws, and also put screw eyes in the ends of one of these pieces. To the floor joist I nailed a brace long enough to be within easy reach of a person standing in front of the furnace. On this brace I pivoted the T-shaped piece, as shown. Parallel wires connected to the eyes, as



This Arrangement Made in Half an Hour Is a Great Convenience at the Furnace

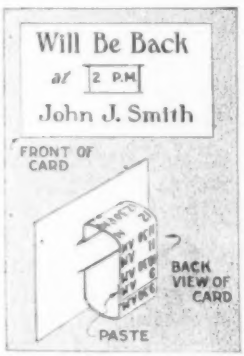
indicated, completed the arrangement. By means of the T-shaped piece I can move the damper readily from the front of the furnace.—Walter S. Jennings, Buffalo, N. Y.

Chipped Grooves Drain Rainwater from Walk Depressions

After several years, stone and various composition walks begin to wear away on the surface. Depressions form near the center of each square of walk, and after a rain pools of water settle in these depressions. A remedy is to chip a small groove from the low spot to the side of the walk, to afford drainage for the water.

Variable "Will Be Back" Sign Quickly Made

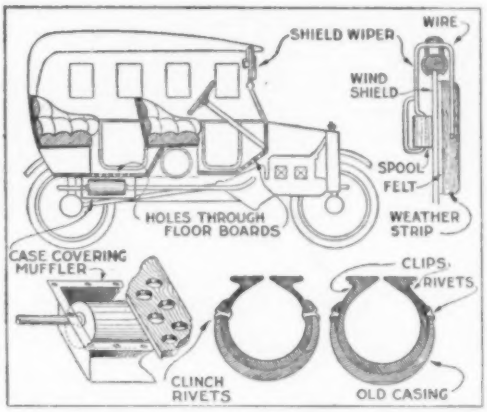
To save time in answering telephone calls for men who are out of the office, a clerk in a large organization devised an inexpensive device to tell when each man expects to be back at his desk. Across the top of a 3 by 5-in. filing card is lettered "Will Be Back at," and below this is the name of the man for whose use the card is intended. Two horizontal slits, 1½ in. long, are cut in the middle of the card about ½ in. apart, as shown. A fairly stiff piece of paper about 8 in. long is slid through these slits. On this strip the office hours, divided into half-hour periods, are indicated. The ends of the strip are pasted together forming a support for the sign. When John Smith intends to leave his desk at 10:00 a. m. for an hour, he simply slides the stiff paper through the two slits until "11:00 a. m." appears on the face of the card. This device makes it unnecessary to bother several people to ascertain when he will be back.



Devices That Add Comfort to Winter Touring

Winter automobile touring or driving, without special preparation, subjects the tires of the car and its occupants to unusual severities. With comparatively slight labor, protection may be provided that will also decrease expenditures for tires. Excess heat, usually lost in radiation, can be diverted to portions of the car to the comfort of the occupants. The method shown in the sketch is effective. Construct a boxlike case for the muffler, and fasten this to the under side of the floor. The casing may be of sheet metal or wood. Through the floor, directly above the deflector, a number of holes should be bored, which will not materially weaken it, yet will permit the heat from around the muffler to escape into the car. The floor boards in the front compartment may be drilled in a similar manner for the heat from the radiator and engine.

Tires should be protected from the frozen roadbeds. Discarded casings will render efficient service as covers, taking most of the punishment of the winter roads, and also increasing the tire diameter and bearing surface, thus making progress through the snow less difficult. The heads of the casings are removed. Coppered clinch rivets hold the casings securely in place, as detailed.

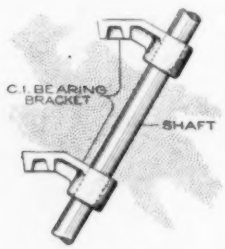


These Homemade Devices and Features Are Practical for Winter Touring or Driving. The Car is Warmed, the Tires Protected, and the Windshield Kept Clean

Another convenience, when driving through snow, rain, or mist, is a home-made windshield wiper. One made of a piece of felt-edged weather stripping, mounted on a bent rod of spring wire, as shown, is practical. The clip is made of sheet metal, fastened by means of a small bolt, and, on the other end of the wire, a spool, with flanges removed, is mounted. If the felt edge is occasionally saturated in equal parts of glycerin and alcohol, it will coat the glass with an oily film, which tends to shed water and makes necessary only occasional use of the cleaner.—G. A. Luers, Washington, D. C.

Fitting Angle-Shaft Bearing Brackets to a Machine

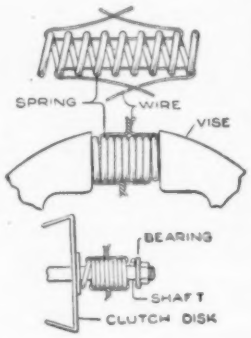
A shaft to be placed at an angle on a machine in bearing brackets, as shown, requires considerable fitting to get the brackets in line, so that the shaft does not bind. To avoid this trouble, the bearing brackets should be bored out ½ in. larger than the diameter of the shaft. The brackets are secured to the machine; small collars, ⅛ in. wide, are provided to slip over the shaft, their outside diameter being the same as the bore in the bearing brackets. These collars are placed in position to enter the holes in the bracket, centering the shaft. Babbitt is poured through a hole drilled in the hubs of the bearing brackets. The babbitt will run around the shaft, locating it easily. It is only necessary, after removing the shaft, to scrape the inside of the bearings and drill an oil hole.—Jos. Limbrunner, Shelton, Conn.



¶In clamping smooth work on machine-shop machines, the slipping of the metal on the surface of the machines can be overcome by inserting a sheet of paper between the work and the machine bed.

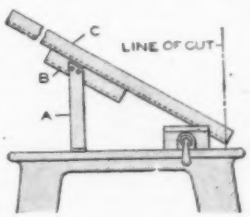
Replacing a Strong Coil Spring

Great difficulty is often encountered in replacing the clutch spring on an automobile, or other strong coil springs, which must be compressed. The operation is frequently dangerous, especially for one man. By binding the spring with wire, as shown in the sketch, and clamping it in a vise, one man can replace the spring quickly and safely. Two pieces of wire are inserted in the spring, which is then clamped in the vise. The wires are twisted and drawn up tightly. Then the spring is set into place, and, when the wires are cut, springs to its proper position.—Ralph M. Brown, Ithaca, N. Y.



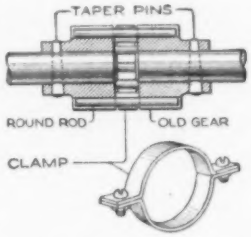
Channel Bars Mitered in Power Hacksaw

In making a large frame out of channel iron, the ends had to be cut at an angle. The rigging, shown in the diagram, was made to line up the channel irons for cutting. The upright A is fastened to the bed of the hacksaw, its lower end being bent at a right angle. The strip B is fastened to the upright A at such an angle that, when the channel iron rests against it, the end will be cut off at the required angle. The channel iron C is held against the strip B with a wooden clamp. The rigging should be in line with the vise so that the lower end of the work may be clamped in the vise. This method saved much time as against doing the work by hand.—C. Anderson, Worcester, Mass.



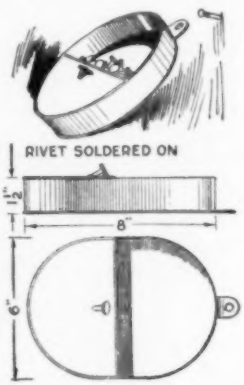
A Quickly Made Shaft Coupling

Two old gears from the shop scrap box were used to make a shaft coupling, which proved quite satisfactory. It was used to connect an electric motor to a small water pump for experimental work. The gears were pinned to the shafts by means of standard taper pins, as shown, after which a series of round steel pins were placed in the spaces between the teeth. These pins were of such diameter as to allow them to fit in the spaces snugly. A clamping collar, made in two sections as detailed, was slipped over the pins, holding the latter firmly in place. The coupling has proved efficient, and also has the advantage of being readily disassembled.—A. L. Snell, Minneapolis, Minn.



Wall Pockets for Storing Rivets and Small Hardware

A method of storing rivets, used by a tinsmith, has many practical adaptations for the home workshop, as well as for the shop or hardware store. The tinsmith made a series of sheet-metal pockets, as shown in the sketch, 6 in. wide and 8 in. long, with an eye at one end to be hung on a nail, or shoulder hook, set in a large board or in the wall. On the front of each pocket, he soldered a rivet, or sample of whatever small article was contained in the particular pocket. When used on a workbench, the pockets are laid flat, exposing the contents.

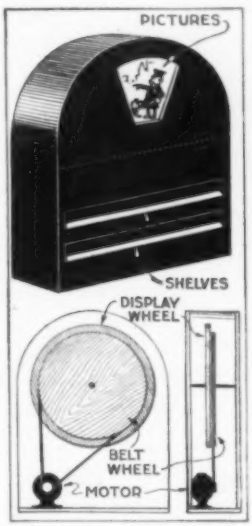


Thawing Out a Fire Plug Quickly

When the fire department was called out one night to a serious fire, the street fire plug was frozen, and ordinary remedies failed to open it promptly. While some of the firemen attacked the blaze with chemicals and what water was available, others poured gasoline, from the tank of the fire truck, over the frozen plug and set fire to it. The plug was soon thawed out, and the fire brought under control.

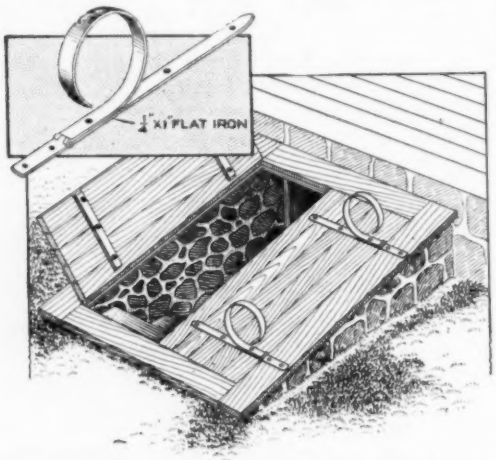
Novel Display Wheel for Show Window

A window advertising novelty which attracted considerable attention, was homemade of inexpensive materials, and driven by a small motor, the whole arrangement being compactly inclosed, as shown in the illustration. A good size for the case is 15 in. high, 3½ in. deep, and 12 in. wide, with a disk about 10 in. in diameter made of two ¼-in. boards. The smaller disk is used as a pulley, and is belted to the motor by small round belts, or cords. Cartoons, or similar devices, with advertisements between them, are mounted on the face of the disk, which can be covered with velvet or other attractive material. The wheel is driven around making the onlooker curious to see the various figures that appear in the opening. Two narrow shelves may be set into the front of the box, as shown, for displaying rings or other small articles. The front of the case is hinged as indicated, so that the disk can be re-covered as desired.



Combined Hinge and Stop for Cellar Doors

Strips of flat iron, ¼ by 1 in. wide, were used to make serviceable hinges



These Combined Hinges and Spring Doorstops Strengthen the Doors, and Keep Persons from Walking on Them

for cellar doors, and a strip was attached to each hinge, curled in the form of a spring, as shown, providing also a practical stop. The usual difficulty with such doors is that the hinges are soon torn loose and the doors racked to pieces. These hinges act as braces across the doors as well as stops. —M. E. Duggan, Kenosha, Wis.

Proof on Letter-Printing Machine Made with Carbon Sheet

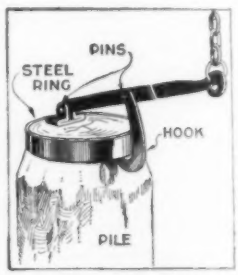
A simple way to obtain a proof sheet of a letter that has been set up for running on a letter-printing machine, without going to the trouble of attaching and detaching the ribbon and getting the fingers full of ink, is to lay a piece of carbon paper on top of the letterhead with the carbon face in contact with the letter, and then feed the two sheets through the machine together. The result will be a legible carbon copy in which all errors are readily found. On account of the extra thickness of paper, the lever regulating the impression should be properly adjusted.—Alfred J. Miller, Albuquerque, N. M.

Broken Motorcycle Nut Repaired on Road

While on a motorcycle trip, far from a repair shop, one of the main nuts on the rear axle of my machine broke in two. It was an odd size, and I could not get another. Finally I clipped a loose end of heavy wire from a near-by fence, filed a V-groove around the edge of the nut on the six corners, and twisted the wire tightly around the nut in the groove. When screwed into place on the axle, the nut held satisfactorily until I arrived home.—W. H. Thies, Washington, District of Columbia.

Hook for Removing Cap Rings from Piling or Posts

In driving posts or piling, a steel ring is usually set over the top to prevent damage to the post from the blows of the hammer, or pile-driver head. Where a number of stakes are driven, it is also convenient to use a ring which may be removed and used repeatedly. The device shown in the sketch can be made in various sizes for removing these rings quickly. On large jobs, power may be applied to the drawbar, and on smaller posts a lever may be hooked to the chain, or the bar may be made long enough to give good leverage.



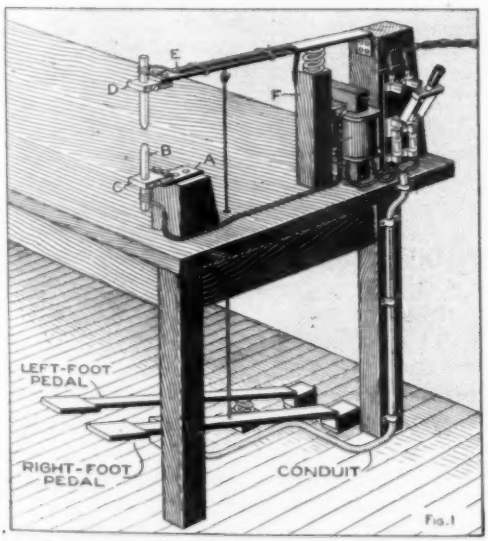
Surfacing Typewriter Platens with Sandpaper

When rubber typewriter platens become hard and uneven they can be made soft and smooth by truing them with coarse sandpaper, and then smoothing them with fine emery cloth. They will then be almost like new, thus avoiding the poor writing caused by hard and uneven platens.

An Electric Spot-Welding Machine

By K. M. COGGESHALL

ELECTRIC spot welding is rapidly replacing riveting as a means of permanently holding together two or more sheets of metal for many kinds of work. The electric weld is more quickly made than the riveted joint; it will not loosen, and is nearly as strong and durable as the material itself, if properly made. For this work a special machine is necessary. The sheets to be welded together are placed between two copper electrodes, as shown in the heading illustration and detailed in the assembly sketch and working drawings. A large current, at low voltage, is then made to flow from one electrode to the other, passing through the intervening metal sheets. As these sheets, which are generally of iron, have a much higher electrical resistance than the copper electrodes, they instantly become hot at the points where the electrodes touch them. The hotter the metal becomes, the greater is the resistance. Finally, the iron sheets are brought to a welding temperature, and a very slight pressure forces the molten metal together, forming a perfect weld at the point of application of the pressure.



A Large Range of Spot-Welding Work can be Done with This Homemade Outfit, the Current for Which is Taken from the Ordinary 110-Volt Lighting Circuit

The constructional features of a modern spot-welding machine for high-speed factory work are quite complicated, but a simple, homemade machine may be built for the small shop at slight expense and without the use of special tools. A machine of this type is shown in Fig. 1. There is no danger of getting an electric shock in operating this machine, the pressure being only three volts, or little more than that of a dry battery. The transformer will stand an instantaneous overload of 400 or 500 amperes on the secondary, which is plenty for small work.

A heavy table, or workbench, serves as the support for the welding apparatus. Near the edge of the table is fastened a wooden block, about 6 in. high and 4 in. square. This forms the support for the bottom electrode, which is held in position by an iron holder fastened to the block by screws, as shown in Fig. 2. The flat bar A is only ¼ in. in thickness, and cannot provide sufficient holding surface for the electrode B. Accordingly an iron block, C, ½ by 2 by 3 in. long, is bolted to A, the electrode being set through it and held by means of a setscrew.

The upper electrode is adjustable up

and down only, with no lateral movement. This is accomplished by bolting the electrode holder D to a flat iron bar, E, as shown. The electrodes must never be permitted to come together while the machine is operating, and as a safeguard a block, F, is provided with a coil spring inserted between it and the bar E. This spring holds the electrodes 4 in. apart.

For the mechanical control of the machine, a right-foot pedal is used. This pedal is connected to the bar E by a wire controlling the position of the upper electrode. The construction of the transformer is next undertaken. A direct-current supply is seldom used for welding, and the alternating current used requires a suitable transformer. It is assumed that the lighting-circuit supply is 110 volts and the frequency 60 cycles, which is the form of current in general use. The transformer consists of two windings on an iron core, as detailed in Fig. 4.

The first winding, connected to the supply circuit, is called the primary, while the other winding, which in this instance is connected to the electrodes, is the secondary. Current flowing in the primary winding will induce a voltage in the secondary directly proportional to the number of turns of wire in each winding. For the making of the core several thin sheets of iron are cut into strips, 7½ in. long and 1½ in. wide, as shown. A sufficient number should be prepared to give two piles, each 1½ in. high. Cut the same quantity of 1½-in. strips, 3½ in. long. These strips are then annealed. Using the longer strips, proceed to build up the pile. The second strip is laid on the first so that it overlaps it at one end by 1½ in. The third strip is then placed on the second, directly over the first one, as shown. The fourth strip laps the third, lying directly over the second, and so on, to complete the pile. It is then bound temporarily with tape. Two such piles are required. The same procedure is carried out with the 3½-in. strips.

From thin fiber or strong wood, cut four end pieces, 3 in. square, with holes through the centers, 1½ in. square, as shown. Slip two of these end pieces on each of the long piles of strips, and secure them in position. Between these ends several layers of linen, or friction tape, are wound on the core for insulating purposes. A coat of shellac is then applied. When the shellac is dry, neatly wind on each of these two bobbins two layers of 63 turns each No. 14 gauge, double cotton-covered wire. This forms the primary winding. After giving the primary winding several coats of shellac, wind on three layers of tape, taking care that the work is neatly done as this insulation must be perfect. Again apply shellac.

Upon this insulation is wound the secondary, for which heavy wire is used. On each bobbin wind two coils of seven turns each of No. 6 gauge, double cotton-covered wire. An outside covering of tape is put on to give the coils a finished appearance. With the two wound bobbins lying side by side, sandwich the other two packs of laminated strips into the ends of their cores, so that a continuous core in the shape of a hollow square is formed.

In making connections great care must be exercised. Reference to the winding and wiring diagrams, Figs. 5 and 6, should be made, noting that the two coils on the primary are connected in series, while all four secondary coils are in parallel. The outside connections are quite simple. Two heavy cables carry the current from the secondary to the electrodes to which they are soldered, as shown in Fig. 2. The primary winding connects, through a pedal-control switch, to the 110-volt lighting circuit. A knife switch and fuses may also be inserted in this circuit if desired.

The pedal-control switch arrangement, shown in Fig. 3, is similar to the mechanical control pedal, except that, when the pedal is depressed, electrical connection is made in a quick make-and-break switch with snap action. The switch is inclosed in a metal case and set in a wooden block fixed to the floor. A heavy coil spring raises the hinged pedal when it is not held down

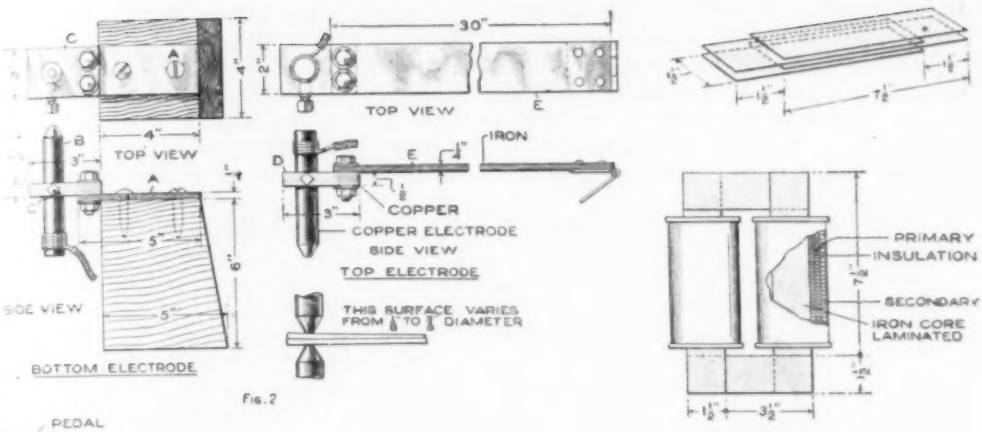
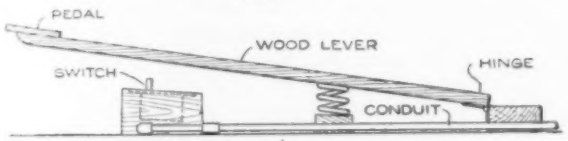


Fig. 2

DETAIL OF TRANSFORMER
Fig. 4



DETAIL OF LEFT-FOOT PEDAL
Fig. 3

Details of Construction: Fig. 2 Shows the Details of the Electrodes and Their Fittings; Fig. 3, the Arrangement of the Pedal Control of the Switch, and Fig. 4, the Details of the Transformer

by the foot. Copper rods are used for electrodes, their diameter being about ⅝ in. The welding end is tapered to a surface varying from ⅛ in. to ⅜ in. in diameter, depending on the work to be done.

Several trials are necessary before successful results are obtained in the use of the machine. The operator should sit down to work the machine so that both feet may be used to control the pedals. After fitting the two sheets together in the exact position desired, they are placed between the electrodes. With the right-foot pedal depressed, the electrodes are brought in contact with the material, and a slight pressure applied. The left-foot pedal is then depressed, allowing the current to flow for several seconds. The localized current heats the metal sheets to a welding temperature, and with a further pressure on the right pedal, the sheets are forced into close contact and the weld is made.

In conclusion, several kinds of metal can be satisfactorily spot-welded. Copper and aluminum are exceedingly difficult to weld, as they offer low resistance to the flow of an electric current. Galvanized iron may be welded satisfactorily, although the zinc will be burned off at the point of the weld. Tin can be welded to tin, or to sheet iron, as may also brass. Sheet iron to sheet iron gives the best weld.

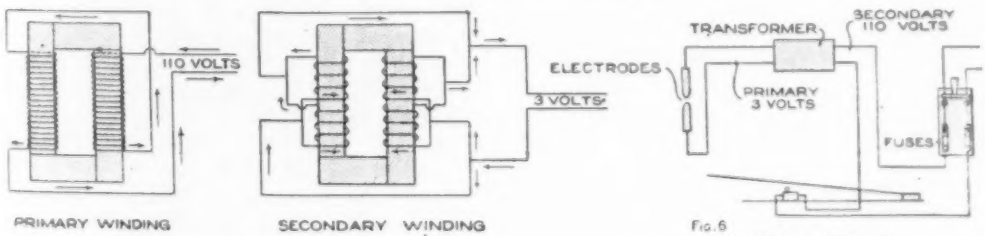


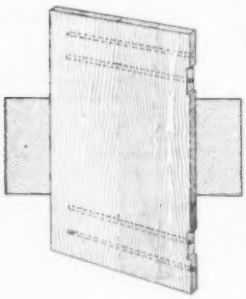
Fig. 5

Fig. 6
WIRING DIAGRAM

The Winding and Wiring Diagrams should be Studied Carefully, so That No Mistake is Made in the Making of the Transformer and the Hooking-Up of the Wiring Connections

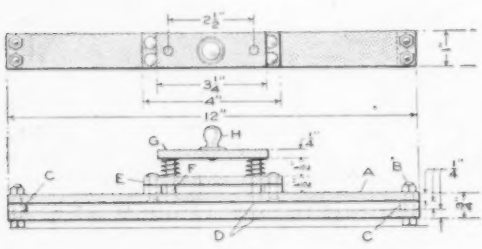
Quick Method of Making Small Doors

Small doors made of several pieces of board, extending vertically, usually require cleats on the back to keep them from warping. A panel door for the purpose is often too expensive, or too troublesome, to make. An attractive and substantial small door can be made by taking two, three, or more pieces and stringing them on dowels, seated in holes bored through the several pieces, as shown. This method is practical in making doors up to 18 in. wide. Match the boards together and nail strips on, to keep them straight. Put the rough door in the vise, mark the places where the hinges will go, and with a long ⅜ or ½-in. bit, bore through the pieces successively, to within 1 in. of the edge of the end piece. Cover the dowels with glue, and drive them home. The bit must be sharp, and the grain must be observed in order to avoid boring through the side.—Henry Simon, Laguna Beach, Calif.



A Perforator for Loose-Leaf Book Fillers

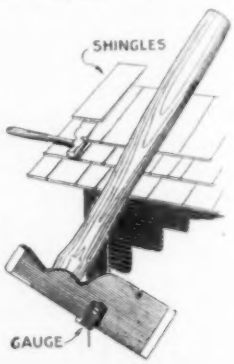
Having a set of loose-leaf books, I made the perforator shown, instead of punching the holes with a plier-type hand punch. It perforates 10 sheets of ordinary paper at one time. To make the device, cut two pieces of ¼ by 1-in. strap iron, A, and drill 3/16-in. holes, B, in them. Drill holes, D, suitably spaced, for the punch rods F. Bolt pieces, A, together, as shown, with ¼-in. strips, C, between them, at the ends. Make the piece E as detailed, and drill holes to match those at D and also holes for the bolts at the end. Fit strips under the ends of the piece E. Thread the steel pins F at one end. Cut and drill the strip G as shown. Thread holes in strip G, and set the threaded pins in place. Fit a wood or metal handle, H, to the piece G. Assemble the parts as shown, and fit open coil springs, ½ in. long, between the plates G and E. Grind off the lower ends of the pins F, so they just come through the top plate A, grinding them at a slight angle to give a shearing effect. The sheets of paper are placed between the plates A, and a sharp blow with the hand on the handle H drives the pins through, cutting neat holes.—Bert Waychoff, Fort Collins, Colo.



A Homemade Perforating Punch of This Type can be Made Easily, and Is Useful Especially for Loose-Leaf Sheets

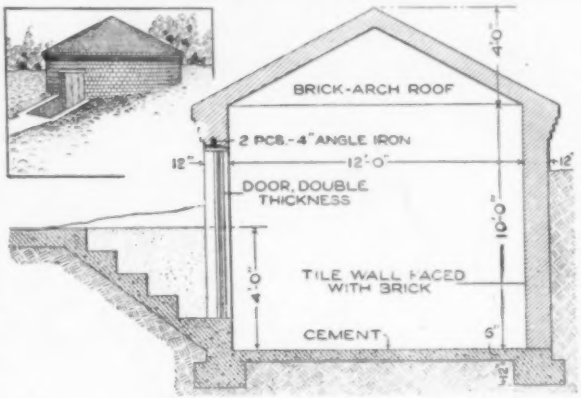
Shingles Set by Gauge on Shingling Hatchet

It is desirable when working on a roof, or other similar place, that as few tools as possible be required for the work. In shingling, this is especially necessary, in order to make speed. A kink that will save much time is the fitting of a small gauge on the front edge of the shingling hatchet, as shown in the sketch, to measure the weather exposure of the shingles. The gauge is a small U-shaped strip of iron, with a setscrew in one side of it, by means of which it is clamped at various positions on the hatchet.—C. J. Shields, Indianapolis, Ind.



A Round Storage Cellar for the Farm

A round storage cellar has attractive features as to practicability, inexpensive construction, and the securing of maximum storage space. That shown was built of brick, but various kinds of masonry materials, or concrete, could also be used. The inside diameter is 12 ft., and the height from the floor to the ceiling line is 10 ft., giving a good-sized cellar for the average farm. The cellar is built largely underground, and the area surrounding it is graded up, after the wall is completed. The floor, the wall foundations, and the steps are of concrete, made of a mixture of one part cement, three of sand, and five of gravel. The footing is heavy, and the floor is 4 in. thick, with a 2-in. bed of cinders or fine gravel. The walls are 12 in. thick, and can be made satisfactorily of 8-in. hollow clay tile, faced with common brick. This gives a desirable double air space in the walls. The door should be 3 ft. wide and 7 ft. high, made in double thickness of matched lumber, with heavy roofing felt between the boards to provide insulation against heat and cold.—W. E. Frudden, Charles City, Iowa.



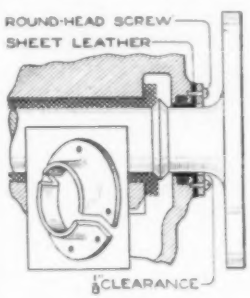
A Good Storage Cellar Is a Worth-While Investment for the Farmer, or Even for the Home Gardener and Fruit Grower

Cement-Bandage Repair on Large Pipes or Cylinders

For mending leaks in irrigating pipes, cracked pumps or cylinders, steam-heating pipes, etc., a bandage of cement and cloth makes a good job. Mix Portland cement and water to a paste; next take a long strip of loose-woven cloth, burlap, or cheesecloth, 3 in. wide, and roll it into a roll like a surgeon's bandage. Work the loose end full of the mortar, and wind it around the leak, taking a handful of the cement mortar and working it well into the cloth, at each round. Continue until the bandage is 1 in. thick; then finish over the surface with the mortar, and let it stand for 48 hours, well protected from wind and sun. It will then be ready for use. If there is a heavy pressure in the pipes, wrap wire mesh around to reinforce it. I have mended leaks in 8-in. irrigating pipe with a 20-ft. pressure, both wooden and iron, by this method.—D. H. Snowberger, Payette, Ida.

Leather Angle Washers Stop Oil Leakage in Crank Case

It frequently happens that the oil in the crank case of a gasoline engine leaks out through the ends. This was the case on the engine of my automobile, and I eliminated the trouble in the following manner: I took a piece of ⅛-in. leather and made a tube of it, the inside diameter being equal to that of the bearings and its length ⅞ in. It was then placed on an arbor, swedged back to the shape shown in the illustration, and cut into halves. Both halves were placed into position, as shown, and two small semicircular segments of a flat ring were screwed on, holding the leather in position.—A. K. Rudolph, New York, N. Y.



Counterbore Ground Quickly from Round Stock

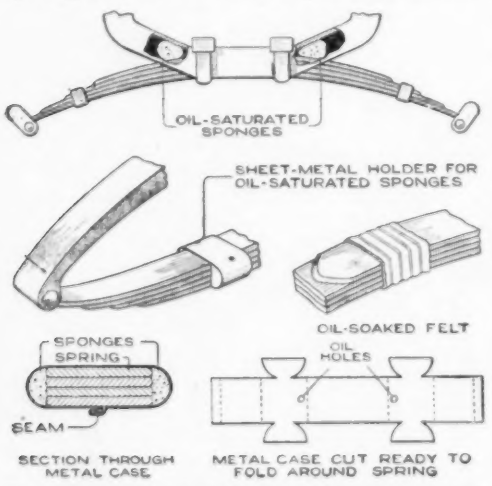
Often the mechanic in the machine shop requires a special size of counterbore and does not find it in his stock of

A Counterbore of This Type can be Ground Quickly from a Piece of Tool Steel, Which is Then Properly Tempered

tools. A quick method of supplying such a bore is to take a piece of tool steel and turn it to a shoulder pivot, as shown in the sketch, and then grind it to the proper cutting edges. The grinding can be done readily on an ordinary emery wheel, and care should be taken to provide the necessary relief at the cutting edges. The pivot, of course, must be made of the proper size for the center hole, and the lower cutting edges of the counterbore should also be given a relief toward the back.

Simple Devices for Lubricating Automobile Springs

A simple method of supplying oil to the transverse, or cross, springs on automobiles, is employed by an expert mechanic. On both the front and rear springs, where these are fastened to the



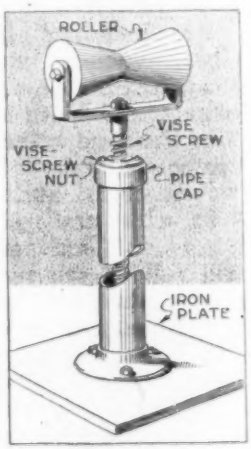
These Devices for Lubricating Automobile Springs can be Easily Installed and Give Good Service

channel frame, forming pockets, he placed small sponges soaked with oil, as shown. When the springs are deflected, the oil flows onto the springs, keeping them lubricated and free from rust. Occasionally the sponges are removed and the oil supply replenished.

Another good method for elliptical, or semielliptical springs, is to use strips of felt, or other porous material, binding this neatly around the spring with twine, and pouring oil over it. The felt is covered with waterproofed cloth or leather. A lubricator, as shown, can also be made, of tin or sheet brass, for inclosing small sponges, which are held to the edges of the blades, on springs of these types. This attachment, as detailed in the pattern, can be either folded over at the under side, into a seam, or flanges may be left to fasten with a screw and nut.—G. A. L., Washington, D. C.

Adjustable Roller Stand for Pipes, Bars, and Rods

In handling long pipes, bars, rods, and similar pieces, a stand, having a roller at the top, is a great convenience, both in the saving of time and of heavy labor. Several of these can be arranged in a row where workmen are shunting the pieces a considerable distance. The stand shown in the sketch is of cheap and simple construction, yet quite substantial. A section of pipe is mounted on iron plates and into the top of it is fitted a screw arrangement. This may be a vise screw and nut, as shown, or a large bolt. The roller is set in a bracket, which is bolted to the vertical adjusting screw.—R. B. Sands, Detroit, Michigan.



Aluminum Salt Shaker Made into Lens Holder

When the hard-rubber holder of an eyeglass lens, used considerably on fine shop work, was broken, it became necessary to replace it promptly. A novel method of replacing the parts was used, the upper end of an aluminum salt shaker being cut and shaped for the purpose. The end was cut as indicated, after the salt shaker had been mounted in a lathe chuck, and the upper end was spun out to fit the lens. The larger end was also spun out to give the proper curve to the holder. The blunt-nose spinning tools used were ground from steel rods and mounted in the tool post.—Ben Frantzreb, Indianapolis, Ind.

Proper Method of Folding Blueprints

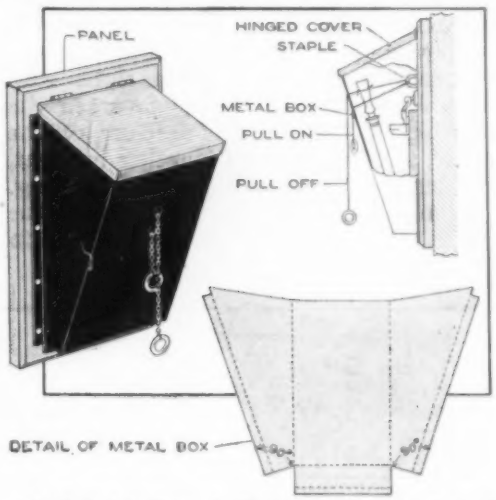
When folding large blueprints for mailing, filing, or other purposes, they should be folded with the blue, or printed, side out, and with the title, or description, in the lower right-hand corner of the folded print. This facilitates handling and filing, and saves the useless unfolding of the print, which wears it unnecessarily.

Old Saws Provide Good Stock for Tools

Various kinds of tools made of flat pieces of steel can be cut from old saw blades, ordinary handsaws being used for the thinner stock, and heavier circular saws for heavier material. The steel must be annealed to make it easily workable, and the tools may be hardened if desired. Some of the tools that can be made in this way are squares, calipers, gauges, and various types of measuring and marking tools, shaped from flat steel.

Metal Case with External Control for Knife Switch

It is dangerous to have an unprotected knife switch so placed that it may be unwarily touched by some one with the bare hand. A good plan is to inclose the switch in a homemade metal case, so that the electric arcs made on opening and closing the switch are properly guarded. A V-shaped box several inches longer than the switch should be constructed from sheet iron, as detailed in the layout. Screw the box to the switch panel, as shown, and make a suitable cover, hinged at the top. The box and cover can be painted black, or the cover painted red to locate the switch box easily. To make a control operated from the outside of the box, as detailed, bore two ¼-in. holes through the front of the box. A staple is driven into the panel near the switch



The Switch is Properly Guarded, and can be Opened or Closed Handily by Means of the Chains

handle. A small chain or cord is passed through the holes and thence through the staple, and to it is fastened the switch handle. Rings are attached to the ends of the chain, and by pulling the correct end the switch will open or close, as desired.—C. M. Hall, St. Louis, Mo.

¶A small boat being towed may be steadied by dragging a bucket behind it.

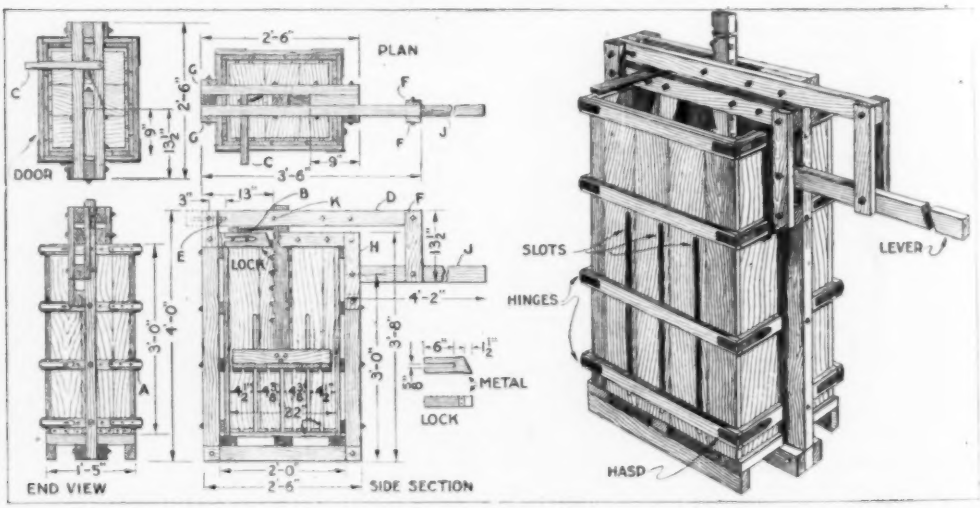
A Homemade Paper-Baling Press

By CLIFFORD A. BUTTERWORTH

HOME mechanics fairly handy with tools can make this baling press at a comparatively small cost, depending on whether or not old material is used. It will soon pay for itself through the sale of scrap paper that would not be accepted in loose form. To operate the press, push the lever D back to the position shown by the dotted lines, lift the ram as far as it will go, and put in the paper. Then lift the lever J about 2 ft., pull the lever D forward so the bolt K will slip into one of the notches, and pull down. Repeat until the paper is well compressed. To make a good bale, a piece of heavy cardboard should be placed on the top and at the bottom. Iron wire of No. 18 gauge is used for tying. When sufficient paper has been used to make a good-sized bale, take three 6-ft. lengths of wire and without removing the pressure insert them in the slots. Run the ends through spaces between the strips, at the top and bottom of the bale, and bring them together in front, fastening them tightly by twisting. Then release the ram and take out the bale. The press should be screwed to the floor with heavy angle irons.

First construct the box of matched ⅞-in. boards. Fasten them together with cleats long enough to project ⅞ in. on each side, and 1½-in. screws. Make the sides 15 in. by 36 in., and the back 21¾ in. by 36 in. In making the back, do not put a cleat at the lower edge. Before screwing on the cleat A, cut the three slots shown in the side section, making them ¾ in. wide. Fasten the sides to the back with angle irons, and then screw in the bottom, which is 15 in. by 20 in. long. Nail the eight 15-in. strips across it, spacing them about ½ in. apart.

Make the frame next, as detailed in the working drawings. In the plan above the end view, the lever arrangement is omitted, to show the frame construction clearly. The lock must also be put in place. Fasten a piece of sheet metal over the beveled end to keep the bolts from wearing the wood, as shown in the lock detail. Lining the slot with metal will make the lock slide easier. A heavy spring, B, is attached to pull the lock forward, so it will engage the notches as the ram goes down, and keep it from springing up. A lever, C, 14 in. long,



A Substantial Paper-Baling Press can be Made at Small Cost of Used Lumber, and will Soon Repay the Labor and Expense from the Sale of the Baled Paper Not Otherwise Salable

is arranged to force back the lock when it is desired to release the ram.

The main lever D is built up as detailed. Cut a slot, E, in the two main upper pieces of lever D, making it ⅝ in. wide. The two 13½-in. pieces F connect the levers as shown. These, as well as the pieces G and H, should be of ash, or other hard wood. The piece H is 15 by 3 by 1 in., bolted at the upper end with an 8-in. bolt, which also holds the frame together.

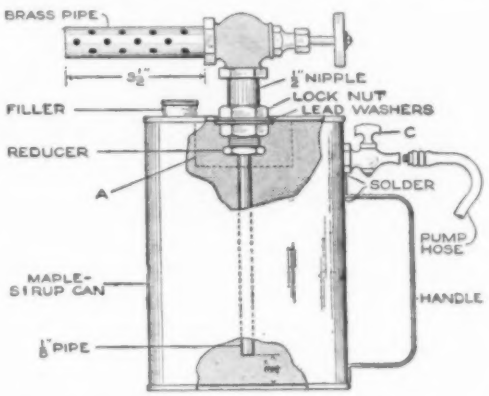
To make the ram, take a 2-ft. 6-in. piece, and beginning 9 in. from the end, bore seven ½-in. holes, 3 in. apart, from center to center, and insert 4-in. bolts. Then, just above each bolt and as close to it as possible, cut a notch, shaped as shown, 1½ in. wide and 1 in. deep. The other details can be easily observed from the working drawings and the perspective sketch.

Novel Illuminated Flag Made of Christmas-Tree Ornaments

The owner of a drug store wanted to display our national emblem in a novel way, and asked me to help him make up a flag, about 12 by 18 in. in size, of small electric lights, for his window. After figuring the cost, I made up a flag that answered the purpose of electric lights at night, and which has the advantage of being plainly visible in the daytime. It was made as follows: A picture frame was procured, and painted a dead black. A piece of black velvet was stretched and tacked over the back of it. An equal number of small red and silver glass balls, ¾ in. in diameter, used for Christmas-tree decorating, were obtained, and also some blue ones, ½ in. in diameter, for the blue field, and ½-in. silver balls for the stars. The stem of each ball was dipped in thick glue, and the balls set in position on the velvet, to make the stripes, the blue field, and the stars. When dry, the framed flag was hung in the show window, and an electric light, inclosed in a reflector, was directed upon it from in front. The colored balls each reflected the electric-light bulb in miniature, giving the appearance of the glowing filament in small electric lamps, and the flag proved very attractive.—G. H. Niederhoff, St. Louis, Mo.

Blowtorch Homemade from Strong Can

A blowtorch is easily made of an old maple-sirup can of heavy tinned



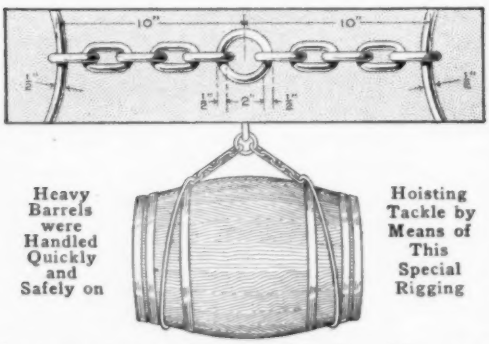
This Homemade Blowtorch Is Inexpensive and Has a Wide Range of Use for the Mechanic and in the Home Workshop

sheet iron, as shown. A ½-in. brass nipple is soldered to the can, and an old globe valve fitted on. Into this is screwed a 3½-in. piece of thin brass pipe with holes bored in it, ⅜ in. apart and staggered. An old bicycle pump, with a ball check valve is provided. A small brass cock supplements the ball check valve, which is opened to force air into the tank. On one side of the can, solder a handle. Remove the cork insert in the filler cap, and in its place put an asbestos washer. Fill the can half full of gasoline and pump in air.

To start the torch in operation, after the proper pressure is obtained, fill a baking-powder can cover half full of gasoline, set it under the torch pipe, and light the gasoline, which heats the valve and nipple. When it is hot, open the valve slightly by the handwheel, and by igniting the spray, a hot flame is produced, which is intensified by the increase of the air pressure.—P. P. Avery, Garfield, N. J.

Tackle for Hoisting Heavy Barrels

Instead of using grabhooks or improvised rope slings for handling heavy barrels on a derrick or with other hoist-

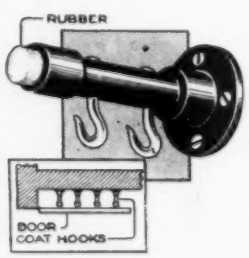


Heavy Barrels were Handled Quickly and Safely on Hoisting Tackle by Means of This Special Rigging

ing apparatus, the shop blacksmith was ordered to make a set of rings with suitable chains to fit the barrels so that they could be hoisted quickly and safely. The rings were made of ½-in. round steel rods, welded. They should be of a size to fit the barrels snugly and to cramp in the positions shown in the illustration.—C. C. Spreen, Flint, Michigan.

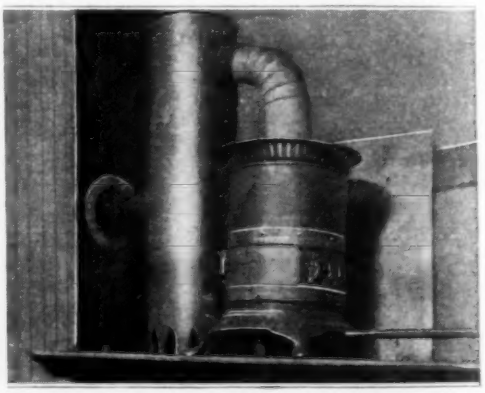
Combination Doorstop and Coat Hook

A homemade device which is used as a combined doorstop and coat hook, singly or in series, is practical where space is limited and the walls behind doors are available for the hanging up of clothes in shops or similar places. It consists of a ½-in. pipe nipple, about 4 in. long, one end screwed into a coupling, in which a rubber stopper is pressed, acting as a buffer, so as not to injure the wall. The other end is screwed into a flange which is fastened to the wall. The hooks are riveted in the pipe. The device is inexpensive, and if bronzed, nickel-plated, or painted, makes a neat fitting. —Ernest Schwartz, Brooklyn, N. Y.



Hot-Air Heater Protects Water Pipes from Cold

In many buildings that have more or less exposed water pipes, considerable trouble is met with in thawing out pipes during a cold wave. This is a tedious, tiresome job, especially where the pipes are hard to get at. This was the case in an oblong three-story building with a large light court running up the center. The water pipes run up along the wall of the light court and are inclosed in a box. The owner avoided frequently frozen pipes by rigging up a stove to heat the pipes in winter, the box carrying the pipes acting as a chimney for heat. There was a natural-gas jet close to the pipe box. A shelf was put on the wall, and an old stove was connected up as shown. The top was made solid so that most of the heat is carried up into a larger pipe with closed top. To avoid danger of fire, the larger pipe has V-shaped



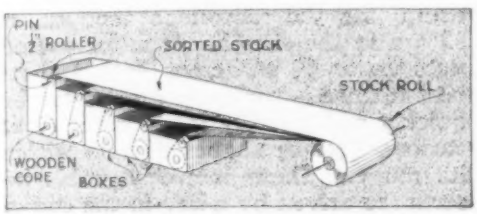
This Heating Arrangement Overcame Troublesome Freezing of Water Pipes in Cold Weather, and was Cheaply Installed

openings cut around the bottom edge to take in air, and the pipe conducting the heat into the box has a large galvanized-iron ventilating collar so as not to scorch the wood. A gas flame, ½ in. high, does the work and uses about 1,000 ft. a month.—Arthur L. Burgess, Columbus, Ohio.

¶Shellac is suitable for varnishing carburetor floats used with gasoline, but is not satisfactory if alcohol is used.

Winding a Roll of Several Layers at Once

To wind a stock roll of several layers of paper, tin foil, etc., in one operation, first have as many small boxes as strips to roll, each one a little lower than the one back of it, arranging them in a row as shown. Cut pieces of ½-in. dowel rod a little shorter than the width of the boxes, and make a roller of each dowel piece. Have the roller just above the front of the box. The rollers are necessary to protect the paper. Have the strips wound, placing them in their proper order in the successive boxes. Bringing out their ends, roll or fold them together as desired. Strips 100 ft. long can be nicely handled in this manner. This method can be used for many purposes, where long strips of different materials are to be rolled together, and kept free from air currents and dirt.—L. M. Drake, Daytona, Fla.



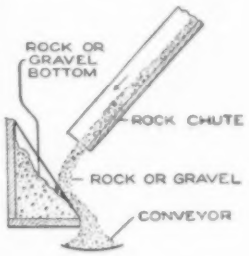
A Stock Roll of Several Layers can be Made Easily with an Arrangement of Bobbins

Small Magnet Useful in Woodshop

An ordinary magnet is a great help in picking out small tools, nails, and other iron objects, from shavings and sawdust. By running it through the shavings collected on top of a workbench, it will collect every small iron article and save many a loss. It can also be employed in locating the position of covered nails before sawing through old work. The magnet should be hung up with a "keeper" across its ends when not in use. An electromagnet, used similarly, will prove still more useful than a common magnet for the purposes mentioned.—Henry Simon, Laguna Beach, Calif.

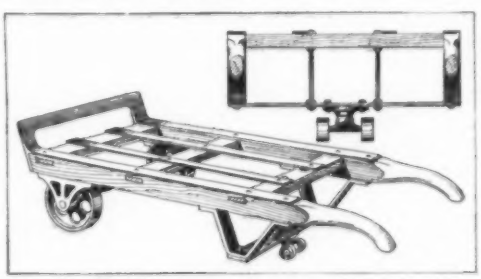
Deflector for Bottom of Rock or Gravel Chute

The sketch shows a method of building a crushed rock or gravel drop, or catch, box to be placed at the lower end of an inclined chute. The continued action of rock or gravel falling from a chute on a bare wooden deflector, or even a deflector lined with sheet iron, soon wears it out, and it must be replaced. By the method shown, the gravel forms its own wearing surface, and the wooden box does not require frequent renewal. This method can be applied to a large variety of work where building materials, coal, etc., are handled in wooden troughs, or in various gravity conveyors.—Roy H. Poston, Flat River, Mo.



Pivoted Rear Caster Improves Barrow Truck

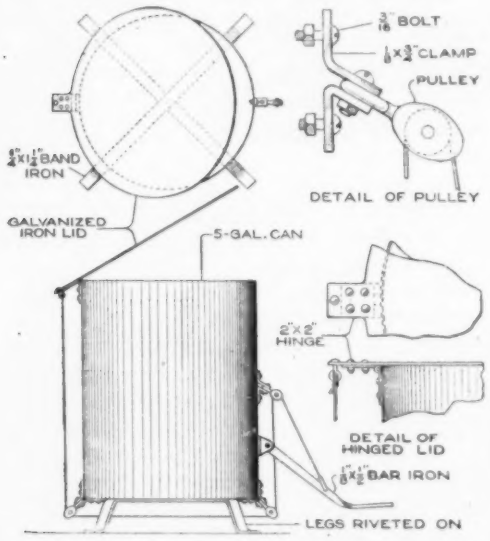
Many hand trucks for carrying heavy loads have only two casters or wheels, and when a considerable weight is being moved the workman finds it hard to handle the outfit. In a large shop it was found that the work was made much easier by fitting the trucks with an extra double-roller caster pivoted under the rear support of the truck, as shown in the sketch. This enables the workman to rest the load and shift it along the floor on its bearings.



The Pivoted Rear Caster Makes It Possible to Handle Heavy Loads without Lifting Them Clear in Transit

Sanitary Shop-Refuse Can with Pedal-Control Lid

To promote sanitation, and the keeping down of possible contagion from



Sanitation was Promoted in a Large Shop by Providing a Strong Pedal-Control Covered Receptacle for Refuse

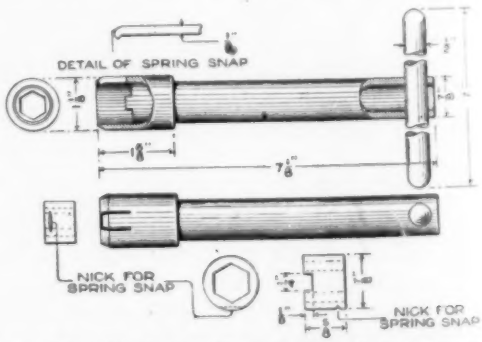
flies and other pests, a strong and practical refuse can was designed as the standard for a large plant, and the various shops were fitted out with these receptacles. Five-gallon cans were used for the containers, and the lids, of heavy galvanized iron, were fitted to them by means of a hinge, as shown in detail. The legs, of band iron, were arranged to support the bottom, and the cover was controlled by a pedal, rigged with a heavy cord and suitable pulley. A detail of the upper pulley is shown in the sketch. The interior of the can was suitably painted, with a black asphaltum paint, and the exterior painted with a lead paint.—A. P. Midland, New York, N. Y.

Concrete Liners Overcome Wear at Turns in Flumes or Troughs

In wooden flumes used for transporting material in water, such as cinders, gravel, and other materials that have a tendency to cut out the sides of the flume, especially at bends, repairs or renewals are often needed, causing a great deal of annoyance and expense. Concrete liners, fitted into the flumes, or troughs, at the points of wear, greatly increase the durability of the flumes, especially at the bends. Nails are driven in the side of the flume before the concrete is set to hold the liner in position.—H. P. Roy, Omaha, Neb.

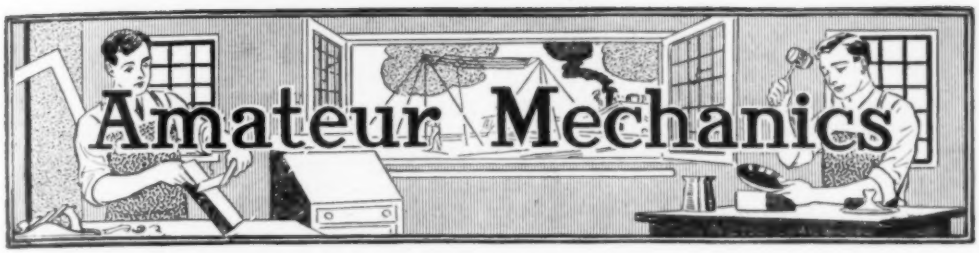
An Adaptable Socket Wrench

A design for a strong, light-weight, adaptable socket wrench, especially useful for the motorist's tool kit, is shown in the sketch. It is for use on nuts up to 5/8 in. across flats, and its best feature is that new inserts can be quickly and cheaply made for it to fit various sizes or shapes of nuts within its range. These interchangeable inserts are driven by a key in the end of the shank, at the bottom of the socket. The insert is retained in the socket by a spring snap which engages a nick on one side of the insert, as detailed. The inserts are made of tool steel, hardened. Machine steel, casehardened, can also be used. The shank is made of steel tubing. The sleeve is also a piece of steel tubing, and is brazed or pinned in place. The spring snap is made by cutting two saw kerfs, about 3/8 in. apart, as shown, and upsetting the end of the



An Adaptable Socket Wrench with a Set of Inserts to Fit Various Nuts Is a Handy Tool for the Motorist or General Mechanic

metal between them so as to engage the nick in the socket.—W. B. Burr, Bridgeport, Conn.

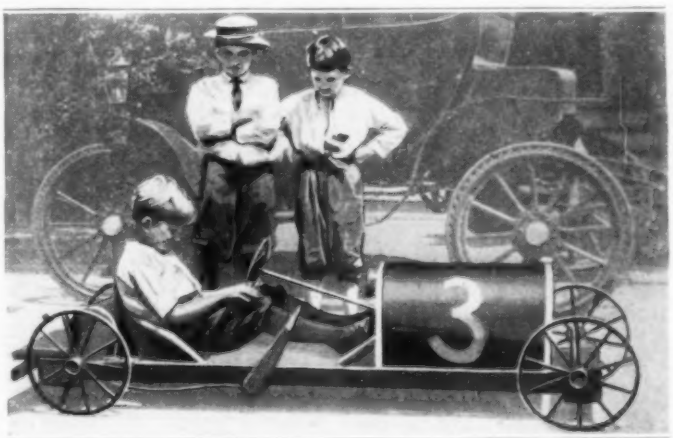


A Child's Motorless Automobile

By H. SIBLEY

A BOY who has a little skill in the use of tools can make his own motor car at about the cost of one circus ticket, and keep it up at considerably less expense. It will be a car that cannot blow up, back-fire, or turn turtle, and its driver will never be hauled into the speeders' court, yet he can, and probably will, have more real sport out of it than his father gets out of a shiny new seven-passenger car.

The machine shown in the photograph, and detailed in the working drawings, was made out of pick-up parts and materials which most boys can get. First, make a rectangular frame, 5 ft. 6 in. long and 15 in. wide, of wood, 1½ in. thick and 3 in. wide. The crosspieces at the ends are fitted between the sidepieces and nailed with spikes, or fastened with screws. Five inches from the front end of the frame, fasten into place another crosspiece against which the front end of the hood is nailed. The back end of the hood is nailed between the sidepieces, as shown in the sketches. These frames for the hood are 16 in. high and 15 in. wide. The rear set of wheels is held in place by clamping down the axle on the frame by means of two strong pipe clamps, made of strips of iron and fastened with screws or bolts. The front axle is mounted under a piece of wood, 2 in. thick, 2½ in. wide, and 17 in. long. A hole is bored vertically through this piece and through the front end piece of the main frame, and a bolt put through these holes as a king-pin.

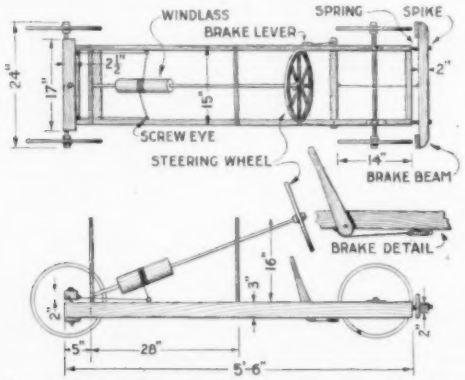


This Elegant Motorless Automobile was Made by the Young Owner and Driver, Who Is Prouder of It Than His Father Is of His New Seven-Passenger Car

The front wheels are steered by means of two heavy cords, attached to the ends of the 17-in. piece, passing through the front of the hood, through screw eyes, as shown, and winding on a windlass set on a wooden rod or iron pipe. The steering wheel is fastened on the end of this rod. The lower end of the rod is fastened at the bottom of the front end of the hood. The latter is covered with tin from an old wash boiler, and nailed along the end pieces of the hood.

A brake beam, to stop the car and to control its speed on inclines, was fitted at the back of the main frame. It was made of a 2 by 2 by 24-in. piece of wood, with contact pads of wood nailed

at the ends, as shown. The brake beam is carried on two spikes driven into the frame, and a coil spring is provided on each spike between the beam and the end of the frame. The beam is drawn against the wheels by means of a wire attached to its middle, and con-



The Construction Is Simple, and the Necessary Materials can be Readily Gathered by a Wide-Awake Boy

nected to a crossbar at the brake lever. This crossbar is 1 by 1½ by 16 in. long, and is pivoted at the end opposite the brake lever by means of a screw. The brake lever is made as shown in the brake detail. It is pivoted at the side of the frame, and connected to the brake crossbar by a wire.

The seat was made of an old coal hod, and the gasoline tank behind it, of an old tin pail. All the parts are suitably painted, and other small details found on large automobiles can be fitted into place to suit the pleasure of the owner. The car is propelled by a passenger sitting behind the driver or by the latter himself, kneeling beside the seat. In coasting, both driver and passenger can, of course, ride without effort.

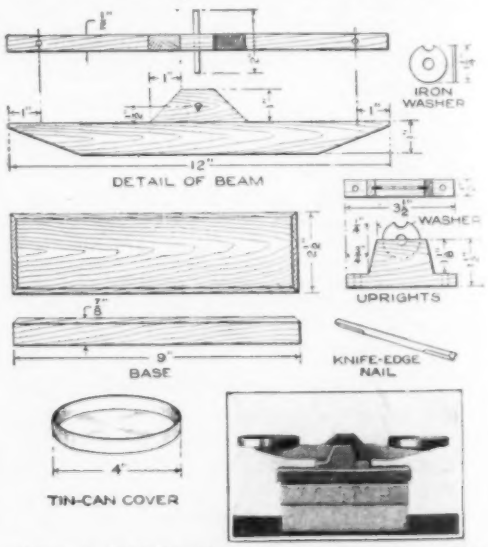
Bottle Caps as Furniture Casters

Crimped bottle caps make good noiseless sliding casters for tables, benches, etc., if a three-cornered file is used to sharpen the crimps, and a piece of wood is placed on the cap to hammer on, so as not to dent the cap in driving the edge into the wood.—A. H. Hale, Brooklyn, N. Y.

A Homemade Beam-Balance Scale for Photographic Work

My photographic scales had become injured in transportation, and, for immediate use, I built a substitute that proved of more than temporary value. It was made from box boards, tin-can covers, a couple of washers, and a large wire nail. The details of construction are shown in the illustration. The beam is 12 in. long, with a small piece nailed to the flat edge, in the center. Then a large wire nail was driven through the center of the small piece, the head cut off, and each end filed to a knife-edge as detailed. Two uprights were nailed to the baseboard, permitting the beam to swing freely. A slot was sawed along the top edge of each upright, and half a washer driven into these slots, and held in place with sealing wax. The tops of the washers were filed to receive the knife-edges.

Two tin-can covers were then tacked carefully to the ends of the beam, and the whole placed in position. The balance was adjusted by driving the required number of tacks on the under side of the lightest end of the beam.

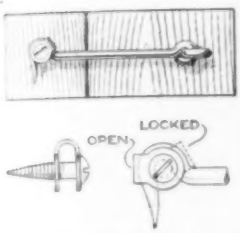


Made of Pick-Up Materials for Emergency Use, This Balance Proved Quite Substantial and Accurate

Weights can be made of lead.—L. B. Robbins, Harwich, Mass.

Locking Device for Latch Hook on Gate or Door

The troublesome opening of a latch hook on a gate or door, permitting intruders to enter or possibly injuring the door in the wind, can be easily overcome by fitting a small catch over the hook, as indicated in the sketch. The U-shaped locking device is cut from a piece of tin, and fastened on the screw over which the hook is set. When locked, it is pushed back over the head of the hook, and cannot be easily jarred out of place.



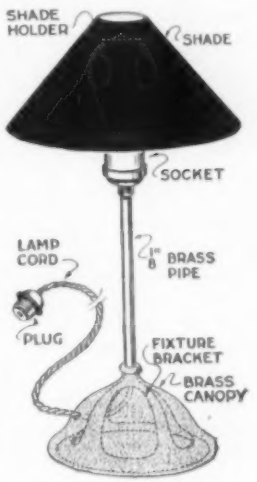
A Vanishing-Cuff Parlor Trick

A trick which is interesting and amusing for the entertainment of the home audience, is performed with a derby hat and a gentleman's cuff. The effect is produced as follows: The performer takes the derby from his head and shows that it is empty. He removes one of his cuffs and drops it into the hat. He tips the hat over so that the spectators can see the inside, and the hat appears empty. He then shakes his arm, and the white cuff reappears, whereupon he places the hat back on his head. The explanation is simple: The white cuff, dropped into the hat, contains a false cuff link, and the inside of the cuff is painted black. A thread holds the cuff in shape until the latter is dropped into the hat, when the thread is broken without the spectators being aware of it. The cuff just fits into the hat, and its ends are deftly snapped beneath the hatband, the hat thus appearing empty. The duplicate cuff is kept on the forearm of the performer, and with a shake, slides into place.—Merritt Hale, Hartford, Conn.

CA little fresh developer added occasionally to old developing solutions will bring them up in speed and intensity.

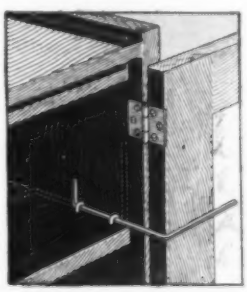
Inexpensive Table Lamp Made of Electrical-Fixture Parts

A small table lamp that is light and easily portable, can be made at a cost of less than $1 from electrical-fixture parts, either old or purchased at a supply store for the job. The base is a bracket, with its brass canopy inverted, as shown. The upright is a ⅛-in. brass pipe, and it is fitted to a standard socket. The shade holder can be made complete from a strip of tin and two wires; or adapted from a commercial shade holder used for candlesticks. Various types of shades, homemade if desired, can be used.



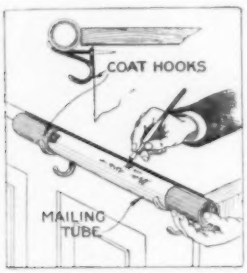
Wire Holders Keep Cabinet Doors Open

Doors of cabinets often have an annoying tendency to swing shut when articles are being removed from the shelves. To overcome this trouble with a kitchen cabinet, I fitted brackets of No. 9 gauge wire into the sides of the cabinet, the wire being bent to the shape shown in the sketch. When the doors are to be held open, the wires are slid forward from their original position, as indicated by the dotted lines, and set in front of the doors. Before the doors are closed, the wires are quickly snapped back into place. — A. S. Thomas, Amherstburg, Ont., Canada.



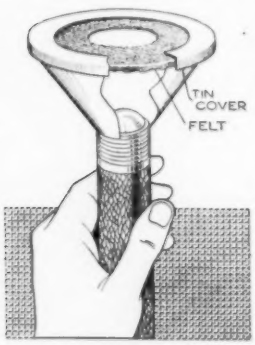
Handy Kink in Addressing Mailing Tubes

The job of addressing a large number of mailing tubes is an awkward one, unless the tube is set so that its upper edge is on a level with the hand. A convenient method of doing this, and a kink which is permanently useful where mailing tubes are to be addressed from time to time, is to arrange ordinary coat hooks at the side of the desk near the front corner, as shown. The tube is placed on the hooks, its upper edge even with the top of the desk, making the writing of the address as handy as in writing ordinarily.



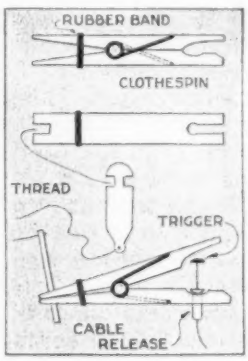
A Flash-Light Egg-Candling Device

A pocket electric flash light can be easily used for testing eggs if equipped in the following manner: Take an ordinary tin funnel and cut off the spout so the small end will fit snugly over the lens of the flash light. Prepare the larger end of the funnel to accommodate a tin-can cover, so the cover will fit tight. Cut out the face of the cover, leaving a ½-in. rim all around, and file the edge. Then cut a 1-in. hole in a piece of felt, place it over the large end of the funnel, and force the cover over it. This may be quickly slipped on and off the flash light and carried in the pocket. The egg to be tested is placed on the felt, over the opening, and the lamp held vertically, the operator looking down on the egg.



Simple Arrangement for Releasing Camera Shutter from Distance

It is usually disappointing to the amateur photographer, when taking pictures of groups of which he is a member, not to be able to be in the pictures. However, most amateurs can construct a release arrangement, in a few minutes, that operates with satisfaction. A clothespin of the clip type is used. The spring should be weakened by bending it from the wood, so that it has just enough tension to bring the jaws of the clothespin together without a snap. Whittle the inner sides of the handles, as shown, so that the jaws accommodate the plunger of the shutter. Then saw a slot in the handles, ¼ in. deep and ⅛ in. wide. Drill a 3/16-in. hole in the whittled depression of one of the jaws, and cut a ⅛-in. slot to it, as shown. The small trigger piece is cut of hard wood. It should fit its slot snugly, at the other end of the pin.

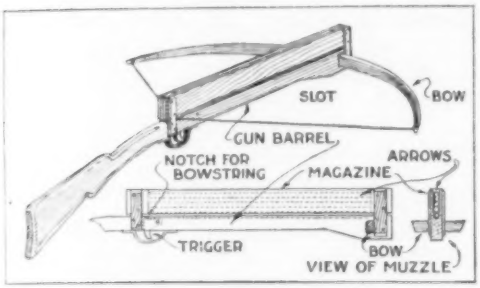


The release device is operated as follows: Slip the plunger tube, with the shutter release cable, into its slot. Keeping the jaws wide open, place the trigger in the slots of the two compressed handles. It is only necessary to jerk a thread attached to the trigger to free the two handles, which in turn snap the plunger. If the tension on the jaws is too strong, put a rubber band around the handles to act as a check.—Werner W. Baumeister, Walla Walla, Wash.

A Crossbow Magazine Gun

A new type of bow gun that a boy can make, and which will give him plenty of good sport, is one of the repeating or magazine variety. To make the gun, cut a soft pine board, 40 in.

long and 5 in. wide. With a saw and knife, cut the gun form as shown. Cut a groove along the top of the barrel, where the arrow will lie ready to be shot out when the hickory bow is released. The magazine holding the five arrows is made of thin boards, 24 in. long, and is held in place by four small strips. The magazine is 3 in. deep, thus permitting the five arrows to lie evenly in it without crowding. The bow is of seasoned hickory and is set



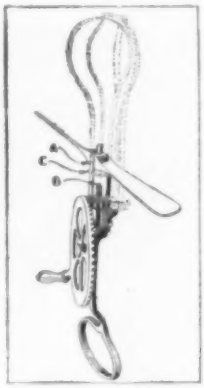
The Arrows are Stacked in the Magazine and Fired in Succession by the Bowstring Released at the Trigger

into the end of the barrel. The notch in which the bowstring catches, should be cut just under the rear end of the magazine. The trigger is an L-shaped, pivoted piece, and pushes the cord off the notch when ready to fire. As soon as the first arrow leaves the gun the one just above it drops down into the groove when the bowstring is again pulled back into place behind the notch. Pressure on the trigger shoots this arrow, another takes its place, and the cord is pulled back once more. The arrows should be of light pine, 22 in. long and ½ in. square, the rear end notched and the front pointed. To make the arrow shoot in a straight course, and to give it proper weight, the head end should be bored with a 3/16-in. bit, 3 in. deep, and melted lead run into the hole.—E. F. Dalton, Cincinnati, Ohio.

¶ Ruling pens often work improperly, or have a tendency to cut the paper because of tiny feather edges at the points. These should be carefully honed and stropped off.

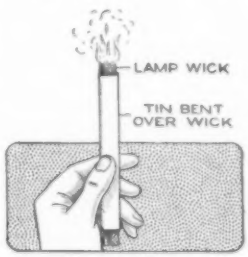
Egg Beater Made into Winder for Model Aeroplanes

One of the features which take the joy out of flying elastic-driven model aeroplanes is the time taken to wind them up. For 10 cents and very little work a fast winder can be made out of an ordinary geared egg beater. Remove the outer small pinion and the revolving beater attached to it. Then cut the other beater off at A, as shown in the sketch, and the spindle at B. A few turns of tinned wire soldered to the spindle will keep the pinion from sliding off. Another piece of the same wire may be soldered to the two arms, at C, to strengthen them. In use, the hub of the propeller is inserted between the two arms, as indicated and the rubber wound.—Morris G. Miller, New Rochelle, N. Y.



Stove Lighter with Feeding Wick Guards against Burns

A stove lighter for gasoline or similar stoves can be made quickly. Cut a piece of tin, 7 in. long and 1 in. wide. Place a lamp wick on the tin so that a part of it projects from the end of the tin. Fold the tin so that the wick is held, but so that it can be drawn out when needed. Saturate the wick in kerosene, or other thicker oil. When wishing to light one or more burners of the stove, light the wick and apply it to the burners. The stove can be lighted with less danger of burning the hands than when a match is used directly.—Lee M. Delzell, Maroa, Ill.



"Switchboard" Protects Milker from Cow's Tail

A simple and effective device for guarding a person milking a cow from being hit in the face by the cow's tail

The Legend Put On the "Switchboard" by the Boys Shows How They Value It

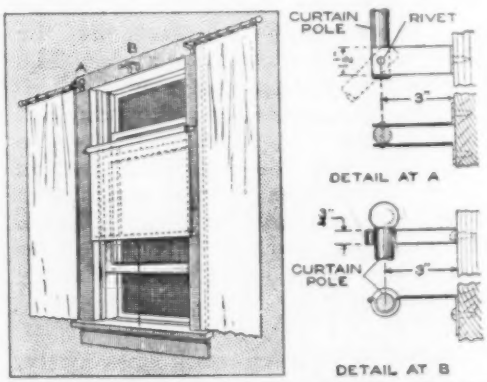
is made of a board, about 10 in. wide and 5 ft. long. This is hung by two wire hooks from a long wire running lengthwise of the stable just over the front edge of the gutter. It is moved along with the milker and effectually protects his face while milking. The device was made by a Wisconsin farmer after nearly losing the sight of an eye in being hit by a cow's tail. He tried tying the tails of the cows while milking them, but found by actual test that some cows dropped down as much as 25 per cent in milk production when their tails were tied. The "switchboard" gives the cows the necessary freedom.—D. S. B., Wisconsin Live Stock Breeders' Association.

Reflected-Light Illumination with Homemade Arrangement

"Friend wife" does not complain any longer because of poor light over the kitchen stove. The windows in the kitchen were so disposed that the light was partly shut off from the stove by the person standing before it. I solved the difficulty in this way: A small window was cut directly back of the stove, in a partition between the kitchen and an adjoining storeroom, locating it just a few inches above the top of the stove. A mirror was placed, after some experimenting, so that the light from an outside window in the storeroom was reflected through the small window in the partition and onto the top of the stove. Plenty of light was thus afforded. Various adaptations of this arrangement may be worked out.—F. E. Brimmer, Dalton, N. Y.

Bedroom Shade and Curtains Arranged for Thorough Ventilation

Curtains, shades, and similar fixtures, often interfere with the proper ventilation of sleeping rooms. By arranging these features as shown in the sketch, the ventilation is not interfered with, and the shades and curtains give the same service as with the usual arrangement. The curtains are hung singly on hinged bars, which may be homemade or those used as towel bars. Details of the supports, at A and B, are shown in the sketch. Two pairs of fixtures are provided for the shade, permitting it to be lowered at night, with free circulation of the air at the top and bottom. The shade is quickly raised, and the



This Arrangement of Curtains and Shade Permits Thorough Ventilation in the Sleeping Room

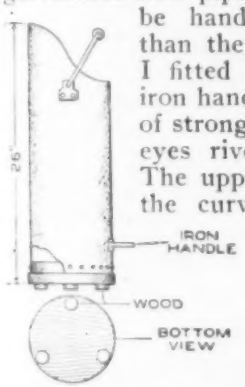
curtains swung into their closed position.—J. E. McCoy, Philadelphia, Pa.

Coffee Grinder Repaired with Rubber Faucet Plug

A rubber piece that held the glass container on a wall coffee grinder wore out, so that the glass would not stay in, putting the grinder out of commission. The piece worn out was a thick rubber washer, tapered at one end to form a hollow in the other, when in place. I cut a section from the thick end of a standard rubber faucet plug, and shaped it to the form of the desired washer. By removing the old rivet carefully, I was able to use it in fixing the new washer into place, and the mill was soon grinding merrily, as of old.—M. T. C., Chicago, Ill.

Coal Hod Made from Iron Pipe

When my coal hod became worn out, I made one of a length of 8-in. galvanized-iron pipe, and found it to be handier and stronger than the kind I had used. I fitted the pipe with an iron handle and with a bail of strong wire, set in metal eyes riveted to the pipe. The upper end was cut to the curved shape shown, and the lower end square, and holes were punched along the edge for fastening it with nails to the double bottom of wood. Three wooden pads were set under the bottom, so that the hod stands easily on a spot that is not quite level.—T. E. Roberts, Toronto, Canada.

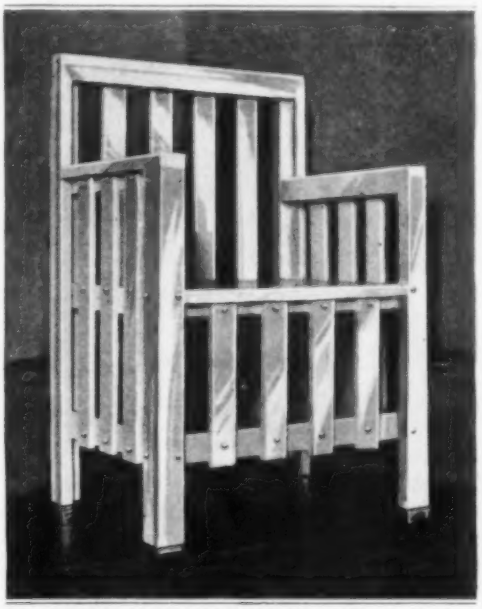


Frayed Shoe Laces Repaired with Pitch or Wax

When the tag or end fastening comes off of a shoe lace, take a little black sealing wax, and press it carefully around the end of the lace and shape it to a point. This will last a long time, and does away with the annoyance of frayed lace ends.

An Enameled Armchair Made of Wooden Strips

An armchair suitable for a dressing table was made by a handy woman from pine strips. The photograph



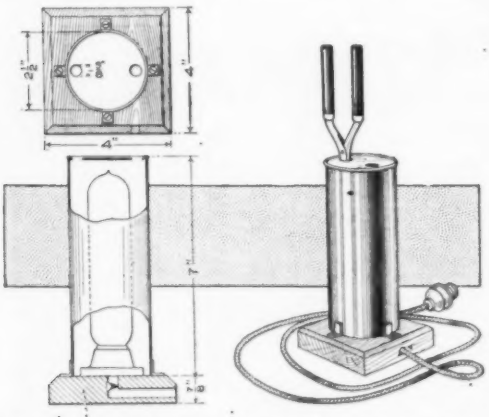
The Simple Construction of This Neat Armchair Makes It an Attractive Job for the Amateur Craftsman

shows the simple and pleasing lines of the construction. Aside from the board seat, only three sizes of wood are used, 2 by 2 in., 1 by 2 in., and ½ by 2 in. The pieces are fastened with screws, round-head brass ones being used at exposed points. The seat is wider from side to side than from front to back. Two coats of white paint and one of white enamel give a good finish.

The dimensions may be varied to suit individual needs. Sizes suggested are: back, 32 in. high and 24 in. wide; side, 26 in. to top of arm and 19 in. wide; seat, 17 in. from floor, 18 in. from front to back, and 20 in. wide between the front supports. The stock is all planed up square to dimensions, and sandpapered smooth. The ends should be cut squarely in a miter box, with a fine-toothed saw, and then sandpapered smooth, taking care not to round the ends.—A. May Holaday, Chico, Calif.

A Curling-Iron Heater

Heating of curling irons is a not uncommon source of fires, and to minimize this danger, an electrical heating



This Efficient Electric Heater for Curling Irons can be Made Quickly and Is Safer to Use than an Open Flame

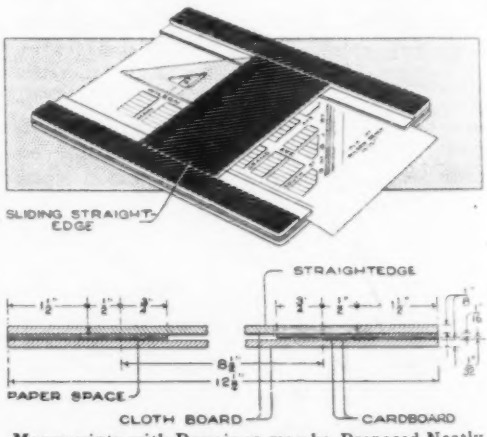
device is valuable. In the arrangement shown, a long candle-shaped incandescent lamp is mounted in a suitable can, or metal tube, to form the body of the heater. This should be bright, both inside and out, and preferably nickeled. Two irons can be heated by setting them in the holes in the top. Four small brackets, soldered, as shown, around the edge of the can, hold it to the base. A porcelain lamp receptacle is used, mounted on a base block. Stain, fill, and finish the wood as desired. In assembling the parts, screw the receptacle to the base, and connect the flexible cord through a suitable hole. Screw in the lamp, and fasten down the body.—John D. Adams, Phoenix, Arizona.

A Stepmother for Incubator Chicks

The best imitation mother hen for incubator chicks that we have found, is built by attaching rag strings to the bottom of an inverted cracker, or similar, box, which accommodates 2 doz. chicks. The rag pieces are torn 1 in. wide, from coarse cloth or gunny sacking, and their loose ends just touch the floor. They are placed close together. An inlet to the mother box is cut in the edge of it. The chicks huddle in among the string rags, keeping safe and warm, whereas without such an arrangement, they may crowd together too closely, and some of them be smothered.—J. Cecil Alter, Salt Lake City, Utah.

A Cardboard Writing and Drawing Pad

Where neatness is desired in the writing of themes, manuscripts, etc., especially if sketches are set into the copy, a homemade writing and drawing pad is useful. The one shown in the sketch can be made easily, and is a handy device for school children as well as older persons. The paper is placed under the guide strips, as shown, and is moved along under the sliding straightedge as desired. Drawing instruments can be used handily along the straightedge, as indicated. The pad is built up as detailed in the sectional views. The general dimensions can be varied. The bottom piece is ⅛-in. cloth board. The second layer is 1/32 in. thick and of cardboard; the next is 1/16-in. cardboard, and the upper layer is ⅛-in. cloth board, similar to the straightedge. The latter rests on the projecting guides for the paper, and



Manuscripts with Drawings may be Prepared Neatly and Quickly by the Use of This Homemade Writing Pad

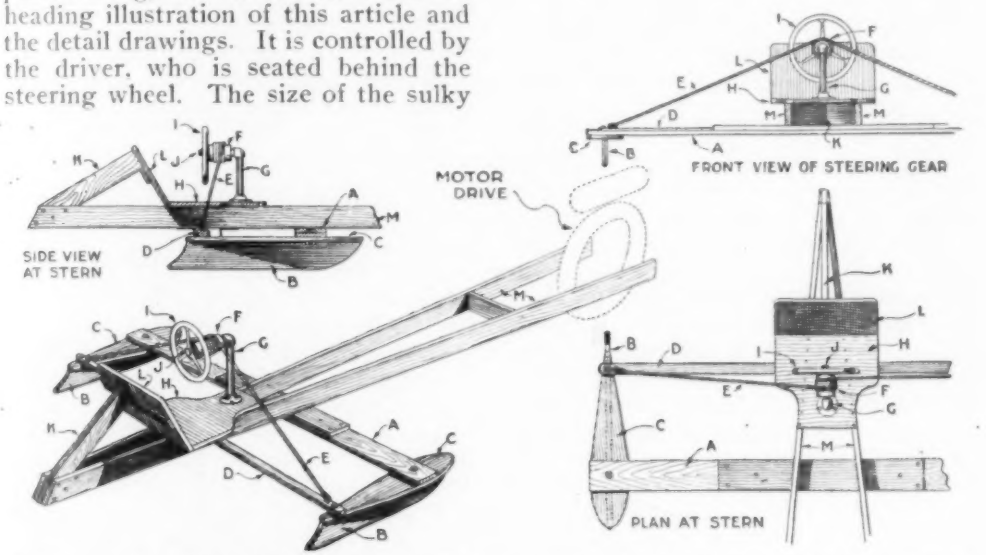
is set between the shaded sidepieces.—R. S. Edwards, Walla Walla, Wash.

A MOTOR-DRIVEN ICE SULKY

by Edward R. Smith

NUMEROUS types of small motors are available for the driving of bicycles and other light vehicles, and a novel installation for motors of this type is as a forward drive for an ice sulky. This power-driven sled is really pulled along, as will be seen from the heading illustration of this article and the detail drawings. It is controlled by the driver, who is seated behind the steering wheel. The size of the sulky will depend more or less upon the size and power of the motor used. The motor is supported in iron brackets at the front end of the main framework, which is carried on a cross frame, A, in turn supported on two pivoted runners, B. A suitable size for the sled is about 6 ft. wide and 11 ft. long.

The long pieces for the main frame M are made of 1 by 5-in. pieces. The crosspiece A is 1 in. thick, 6 in. wide, and 6 ft. long. The stock should be fully 1 in. thick, and preferably 1⅛ in., rather than the common ⅞-in. material. The crosspiece A is braced with a piece about 3 ft. long, fastened on top of it with screws. The runners B are of 1-in. stock, shaped as shown in the side view at the stern, and shod with semi-oval-section band iron. The pieces C are fastened on top of the runners with flat-head screws, and provide a suitable bearing for the pivot at the ends of the crosspiece A. The runners pivot on ⅜-in. bolts fitted with washers and jam nuts. At the back end of the runners is a cross strip, D, 1⅛ by 2 in., pivoted at the runners. The control cord E is attached to the ends of this strip by means of screw eyes, and is wound on the drum F like the rudder cord of a motorboat. The craft is steered by the shifting of the runners at the rope control.



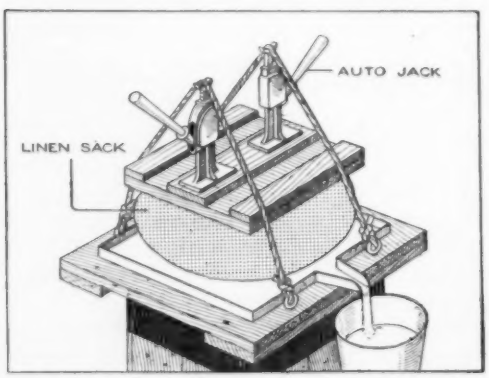
The Construction of This Motor-Driven Ice Sulky Is Interesting, the Power Plant being Located at the Forward End of the Frame, and the Weight of the Seat and Driver being so Distributed as to Give the Proper Balance and Traction

The construction of the control arrangement is shown clearly in the various views. It consists of a support, G, of 1-in. pipe, mounted on the front of the seat H with a flange. At its upper end is a short section of pipe joined with an elbow. The wooden drum F is carried on this section of pipe, and the wheel I is held in place, firmly fixed to the drum F, and locked by a pipe cap, J. The back rest L is a ⅞-in. board, supported by a cleat, and braced between the two pieces of the main frame by the 1-in. piece K. Screws should be used throughout the construction in preference to nails, and they should be flat-head, and countersunk flush with the surface.

The crosspiece A also serves as a foot rest, and can be braced by four strands of No. 18 gauge wire, twisted double and fastened about 10 in. from the ends of the piece A, and about 3 ft. to the front and rear of the crosspiece, on the main frame M. When the motor fittings are in place, the engine controls are wired at the seat within easy reach of the driver. Proper balance of the sulky can be obtained only by experimenting with the position of the seat, because of the variance in the weight and type of the motor. The fastenings for the seat and crosspiece A should be made temporarily so that they can be shifted along the main frame. The wooden parts should be oiled with linseed oil, to protect them from the weather, and the metal parts properly painted or otherwise protected against corrosion.

Auto Jacks Rigged Up as Cider Press

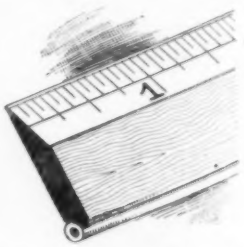
With two automobile jacks, a strong linen sack, a sheet-metal tray, two ropes, and some boards, a cider press was improvised that crushed a large quantity of fruit easily. The arrangement was set up as shown. One jack, or even a jackscrew, might be used. The boards were cut and nailed up to form the platforms. The lower platform was fitted with a shallow pan, at one end of which a spout was soldered, draining the liquid into a pail. A more permanent wooden frame might easily be devised to support the jacks.—F. Ball Pinkus.



A Considerable Quantity of Fruit was Crushed and the Resulting Liquid Drained Off with This Improvised Arrangement

Rubber Pad Aids in Guiding Ruler

Artists, especially those doing photographic retouching, use a ruler and brush for making straight lines. It is necessary to have the ruler elevated, or set at an angle so the ruling edge is raised high enough to clear the hairs of the brush. A good method is to glue a piece of soft rubber tubing to the back edge of the ruler. The ruler is gripped at one end with the fingers underneath, the rubber hose resting on the surface worked upon. By moving the fingers backward and forward, the ruler is raised, and the rubber keeps it from slipping, especially on delicate airbrush surfaces.—Samuel H. Avery, Chicago, Ill.



Front and Rear Electric Lights Fitted on Baby Cab

Piloting a baby carriage after dark on heavily shaded walks often presented difficulties at the curbing, the jolt resulting in a "solo" at the rude awakening. I remedied the trouble by

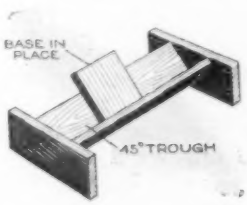
placing two lights on the front and one on the rear of the cab. The cells were connected in parallel. The wiring was fastened by japanned-tin clamps. The wires were concealed, and fastened to the under side of the framework. A

In Evening Airings, Baby was Spared Many Rude Jolts at Street Crossings When the Dark Curbing was Lighted by the Head and Tail Lights on the Cab

small homemade knife switch controls the circuit from the handle of the buggy, 1½-volt lamps being used and the current derived from two dry cells, fastened to the under side of the seat and inclosed in a box. The lights are convenient also in lighting a stairway when the cab is being taken up or down.—Dr. C. L. DeCou, Los Angeles, California.

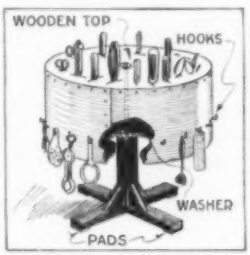
Sandpaper Trough for Beveling Instrument Bases

It is sometimes difficult for the amateur to get perfect bevels on the bases of homemade instruments. A simple and effective device for this purpose is made as follows: Two pieces of wood, ½ by 4 by 12 in. long, are fastened together by end pieces to form a trough, the sides of which are at an angle of 45°. After beveling the base with a plane, it is laid against one side of the trough with a piece of sandpaper laid on the other side. By rubbing the base over the sandpaper, a perfect bevel is obtained.—Thomas W. Benson, Philadelphia, Pa.



Kitchen Knife and Utensil Holder Made of Cheese Box

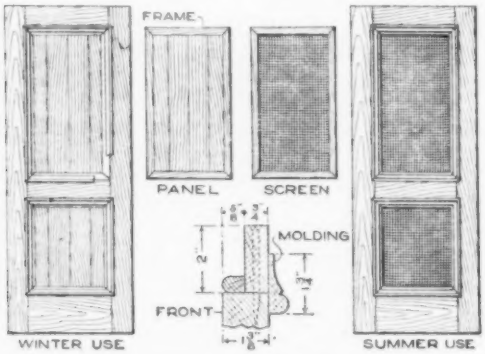
The best feature of this revolving knife and utensil holder is that it protects the knives. Kitchen knives should not be put into a box with other knives, forks, spoons, etc., because the edges are soon injured. The revolving holder was made from a cheese box mounted on a base by means of a rod, as shown in the sketch. The top was provided with slots, as convenient. The knife slots are around the outer edge, and the knives hang where their edges do not hit each other or utensils. The sharp edges should always be put outward. The spoons, forks, meat maul, etc., all have proper slots toward the center. Utensils, hung like this, are very convenient to get at, and are also protected from dust. Small hooks at the lower edge are handy for hanging up the egg beater, strainer, and other much used articles which cannot be set readily into the slot in the top.



Screen and Storm Door for All-Year Use

If a strong frame is provided for a screen door, it can be easily fitted up to be used as a storm door in winter, and then again quickly changed for use as a screen door by the method of construction shown in the illustration. The door frame is built of 1⅜-in. stuff, with a wide rail at the bottom, which provides a foot plate where otherwise the wire mesh might be quickly broken. For summer use, the panels are fitted with screen frames, as de-

tailed, the frames being fitted between moldings fastened with round-head screws. In the fall, the screens are removed, and panels built up of matched

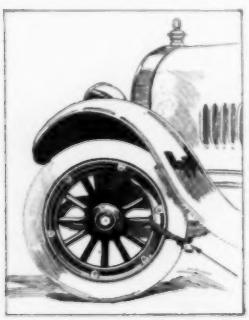


A Substantial Door can be Easily Fitted with Screen Frames and Wooden Panels, Used Interchangeably, Summer and Winter

siding, ¾ in. thick, are set in the frame. While the first cost of such a door is greater than a single door, it can be made by the home carpenter more cheaply than can two doors, one for each season. Besides, a door of this kind, if well made, will not detract from the appearance of a well-kept home structure.—John R. Preston, New Glasgow, N. S., Canada.

Simple Means of Locking Automobile against Theft

Locking the front wheel of an automobile in a cramped position by means of a heavy welded chain and a good padlock is effective, as it is then impossible to move the wheels, or steer the car, since it will not even be in condition to be towed. The method has several advantages: impossibility to tow the car; secure locking of the wheel; assurance of safety owing to the inability of a thief to steer, as the car could only go in a circle.—A. P. Marsh, Chicago, Ill.



Parting Wedged Drinking Glasses

Drinking glasses and similar articles often become wedged together so firmly that it is difficult to part them without damage. A simple method of parting glasses is to pour cold water into the inner glass and set the wedged glasses upright in a dish of warm water, which should then be gradually heated by pouring hot water into it. The contraction of the inner glass and expansion of the outer one will release the two.—L. J. L. Pouliot, Ottawa, Ont., Canada.

Framing Pennants Preserves Them as Souvenirs

Because nailing into the wall was forbidden in the lease, a new method of hanging pennants was devised by some "rah-rah" boys in college. Frames of narrow molding were made for the pennants, and hung from the picture molding. The walls could thus be cleaned easily and no "island" was left when one of the pennants was removed. Not the least important is the fact that the pennants are kept clean, and can be taken away from college as souvenirs, whereas the average pennant, unprotected, is soon dirty, an unpleasant reminder of pleasant associations.—William P. Langreich, New York, New York.

Repairing a Leaky Gas Hose

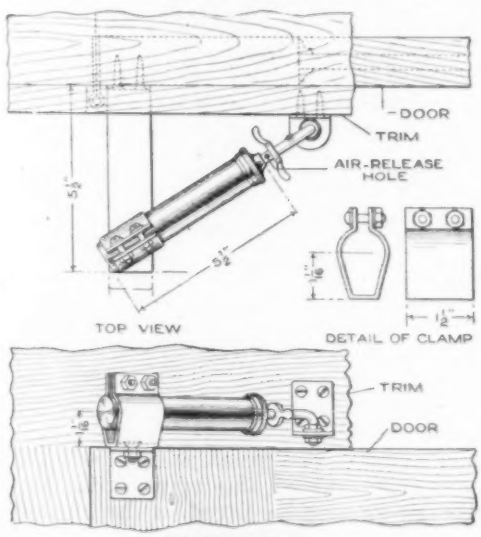
A cloth-bound rubber gas hose, which sprung a leak, was easily repaired with glue by applying a goodly drop over the leak, bending the hose so the leaky part would be distended, holding a finger over one end of the hose, and drawing the breath through the other. In this way the glue was sucked into the fracture. Straightening the hose, and permitting it to dry, completed the job.

Grinding Writing and Lettering Pens

A fine or coarse writing or lettering pen can be produced quickly by means of an oilstone. By rubbing it at the sides of the nibs, the pen is made finer, and grinding across the ends makes it coarser. By grasping the penholder in the normal writing position, and writing lightly on the surface of the stone, the pen may be ground to the style of the user, making it write more smoothly. If the pen scratches, a slight touching up on the stone, which should be a fine hone, will remedy the difficulty.

Pneumatic Door Check Made of Bicycle Pump

A door was provided with a heavy coiled spring that caused it to slam shut, and in order to overcome this nuisance, a check was made from an old bicycle pump. The fittings being worked out neatly, did not mar the appearance of the woodwork. Band iron, 1/8 by 1½ in., was used for the fittings. A clamp, as detailed, was made to hold the end of the pump cylinder. A bracket, 5½ in. long, of

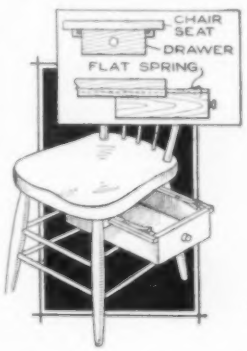


This Neat and Effective Door Check was Made of an Old Bicycle Pump and a Strip of Iron, Shaped and Polished

similar iron was fastened to the door, as shown, with screws, and the clamp bolted to it. The end of the plunger was extended and bent at a right angle, so as to pivot in a small angle bracket attached to the trim, as shown in the front view. An air-release hole was provided, as indicated, so that the air was freed from the cylinder gradually as the door closed, thus preventing slamming.—P. P. Avery, Garfield, New Jersey.

Convenient Tool Drawer under Chair Seat

For the householder who does small repairing occasionally at home, a sliding drawer under his working chair will be found a convenience. The tools are always handy when he sits down to his work, and he can put them away again without arising from the chair. This arrangement is also useful in small shops where a chair or stool is used for tinkering and light bench work.—James M. Kane, Doylestown, Pa.



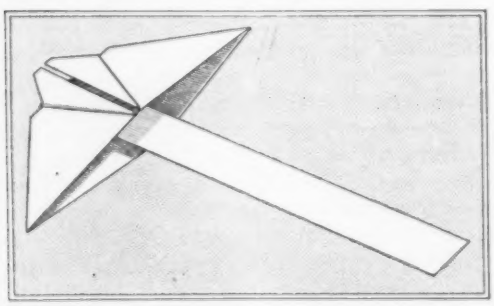
Red Windows in Daylight Photographic Workroom

Instead of the customary dark room, with the expense of red incandescent lamps or the evil-smelling oil lamp, the photographer who works during the day should have a red room, obtained by means of a window with panes of red glass. The amateur can cover the windows with red cloth, through which will penetrate a diffuse red light of the desired quality. This is far superior to the common practice of providing an opaque screen, blocking up the windows, etc., and the screen can be made of red cloth instead of black cloth, just as handily. Proper ventilation should, of course, be provided.—Alfred J. Miller, Albuquerque, N. M.

A Model Paper Monoplane That can be Steered

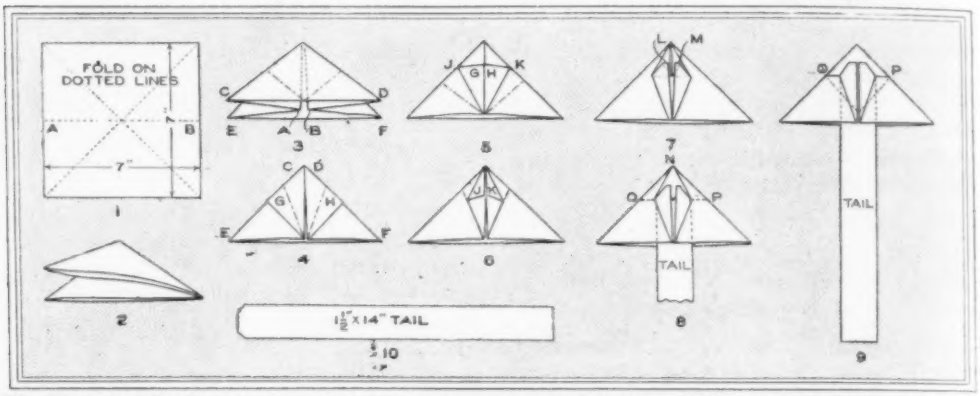
An interesting bit of paper construction is a small monoplane made from a 7-in. square of paper, folded as indicated in the diagram and provided with a paper tail. This little monoplane can be steered by adjusting the tail, and even made to loop the loop in the varying air currents. For the boy who enjoys experimenting with such a model this little construction offers much instruction and entertainment, and the grown-up who still has an interest in such things will also find it a worth-while job.

To make this model, fold a square of medium-weight paper on the dotted lines, as indicated in Fig. 1 in the dia-



This Model Monoplane is Made of a Sheet of Paper, Seven Inches Square, and can be Steered by Bending or Twisting the Tail

gram. Then unfold the sheet and refold it as in Fig. 2. Then bring the folded corners A and B into position, as shown at A and B in Fig. 3. Fold the corners C and D upward to the position C and D in Fig. 4. Fold corners G and H to the corresponding letters in Fig. 5. Fold points J and K to the corresponding letters in Fig. 6.



The Method of Folding the Paper is Indicated Clearly in the Diagrams, Which are to be Followed in the Order of Their Numbering, the Tail being Inserted Separately

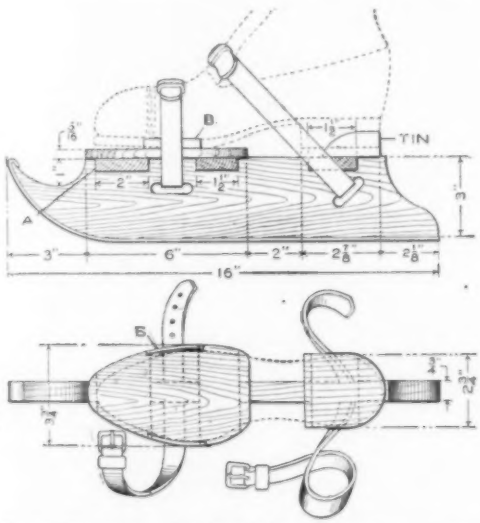
Raise the points J and K, Fig. 6, and fold them in so that the corners which were below them in Fig. 6 now come above them, as at L and M in Fig. 7. Fold the corner N back along the line OP, Fig. 8, so that the shape of the main portion of the model is as shown in Fig. 9, at OP. Make the tail 1½ by 14 in. long, as shown in Fig. 10, and paste it into position. This completes the model, which can be steered by bending or twisting the tail.—George H. Stipp.

Roll-Film Spools Useful in Economizing Pencils

Now that everyone should economize, short lead pencils should receive attention. A convenient lengthener is easily made by removing the metal ends from used film-camera spools, the 3¼-in. length being the best size to use. The pencil is cut to fit the unslotted end of the spindle tightly. An eraser may be fitted in the slotted end. In a school quite a saving was made by collecting the short pencils of the pupils and having them thus fitted up in the workshop.—A. T. Moss, Napa, Calif.

Homemade Skates for Use on Hard Snow

A pair of snow skates that a boy can make, will give him much fun and winter sport long before the ice is strong enough to make it safe for skating. The skate is made with a wooden runner, 16 in. long, 3 in. high, and ¾ in. thick, shaped as shown in the sketch. It is fastened to the shoe with two straps. Slots for the straps are cut through the runner, as shown. After the runner is shaped, it is shod with a strip of flat band iron, fastened at the ends with countersunk screws. The rests for the heel and the front of the shoe are made of wood, shaped as shown in the top view. Crosspieces, A, support the rests and are notched into the top edge of the runner and fastened securely. The edges of the



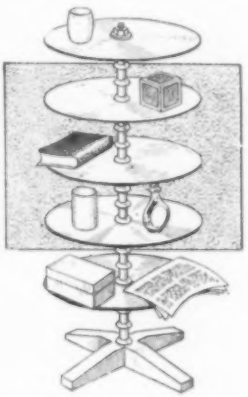
Snow Skates can be Used for Skating on Hard Snow or Ice on Streets and Sidewalks, Long Before the Usual Skating Places are Frozen Thickly

sole and the heel are kept from slipping off by guards made of tin, as shown at B and at the heel. The skates should be well oiled with linseed oil, to protect them from the snow and water.—Charles Kvasnicka, Chicago, Ill.

¶The temperature of photographic baths should be uniform, 65 to 70° F., to give the best results.

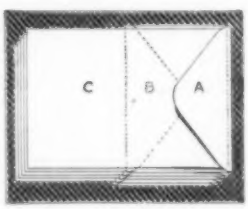
Stand of Shelves Made of Old Disk Records

A useful stand, or series of circular shelves, may be made from discarded disk phonograph records by supporting them at suitable intervals along a small iron rod. The rod is supported in an upright position, being fastened to a suitable base, as shown. The shelves are separated and held properly spaced by empty thread spools, slipped over the rod. This makes a convenient stand for displaying small articles in shop windows, etc., as well as for use in the home.—Roy H. Poston, Flat River, Mo.



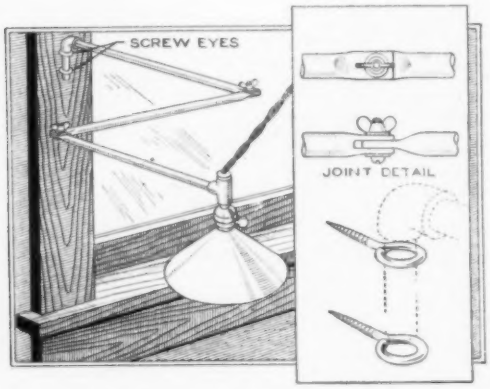
Handy Arrangement of Writing Paper in Box

To simplify getting an envelope and a sheet of writing paper from the ordinary writing-paper box, the sheets being in the bottom and the envelopes on top, the following method will be found useful: Remove all the envelopes and paper from the box, and arrange the envelopes, each to hook over the end of a sheet of writing paper. Then stack these sets, so that an even pile is formed with a row of envelopes at each end. Set the pile in the box, and the writing materials may then be removed handily, an envelope being taken with each sheet of paper. Several extra sheets of paper and envelopes may be kept on the top of the pile keeping it intact when second sheets are used.—Everette Alan Browne, Riverhead, N. Y.



Adjustable Bench-Light Bracket Made of Pipe

Schemes for holding an electric light over a workbench are nearly as numerous as mechanics, but here is an arrangement that is simple, and which can be made quickly in the home shop. Several lengths of ½-in. gas pipe are slitted at the ends, flattened and drilled for screws with wing nuts, as shown in the sketch. The wall end of the bracket is supported in two screw eyes, and the other fittings are made from standard parts. An insulator is fitted into the vertical end of the pipe tee, as shown, to protect the light cord.—C. C. Spreen, Flint, Mich.



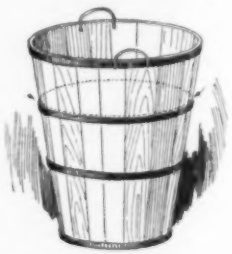
A Strong and Practical Bracket for a Bench Light was Made of ½-In. Gas Pipe

Old Photo Films Made into Label Holders

By using pieces of old photo films from which the emulsion has been cleaned off, and folding them around a cardboard label of the desired size, one end open as shown, serviceable label holders were cheaply made. The holders can be made in sets, so as to be uniform, and can then be tacked in place by means of small tacks set along the edges. The open end permits withdrawal of the label for convenient changing of the titles as required.

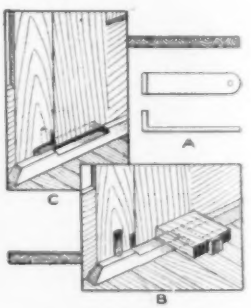
Old Vegetable Baskets Made into Wastebaskets

Several large baskets of the kind used by produce dealers for packing vegetables, were on hand, and no special use was found for them because of their large size. By cutting off the upper section, just above the middle band, and strengthening the edge by tacking on loose staves, useful baskets were provided for waste paper and other articles. By trimming these baskets suitably, a small hotel made use of them in each of the rooms.—M. T. C., Chicago, Ill.



Angle Door Stop and Lock at Threshold

A convenient door stop and lock was made of strap iron, bent as shown at A. The stop is fastened to the floor by means of a screw, so that the upturned end clears the vertical edge of the door about ¼ in. It is used as a lock by placing a block between the door and the stop, as shown at B. The door can also be left ajar, the stop checking it. The length of the stop should be such that the edge of the door, when standing ajar, covers the screw, making it difficult to loosen the latter. A small catch locks the stop, as indicated at C.—W. B. Long, Washington, D. C.

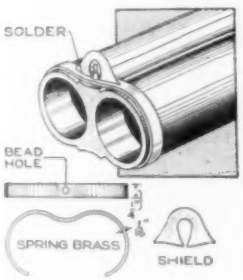


Novel Signs and Numerals Made of Rope

Pieces of clothesline, or other rope, can be fashioned easily into novel and practical numerals and figures for signs, especially on boats and marine structures. An interesting manner of using rope is for the making of house numbers, the strips of rope being neatly tacked into place with small brass straps. The ease with which the rope can be shaped makes it possible to form quite intricate designs with it.—O. Tryon, Boston, Mass.

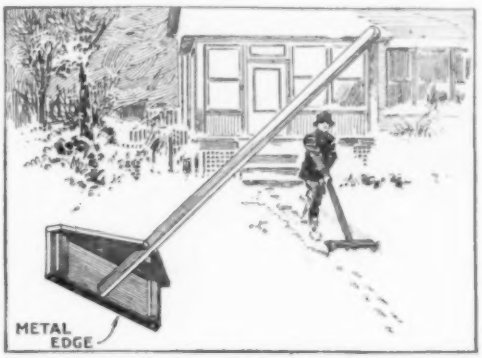
Shield for Shotgun Bead Improves Sighting

Even experienced riflemen find difficulty in sighting a shotgun unless they are familiar with this sporting arm, and a shield like that shown in the sketch is a great help in sighting the gun properly. A band of spring brass, ¼ in. wide, is shaped to clamp around the end of the gun barrels. A small shield of similar material, made as shown in the detail, is soldered to the top of the band. The latter can be easily slipped into place or removed. The shield gives a sharp contrast between the bead and the opening around it, making it easy to sight.—Herman F. Zimmermann, Los Angeles, Calif.



A Substantial Homemade Snow Scraper

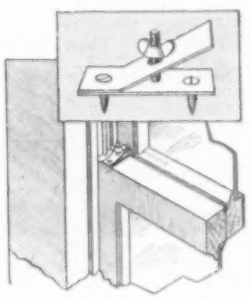
The ordinary fall of snow can best be removed from walks by means of scrapers. A simple but strong construction is the following: Use one board, 1 in. thick, 6 in. wide, and 24 in. long, for the scraper part. To this is rigidly fastened another board of approximately equal length and width, notched in the center for the handle, which can be made of a suitable pole, about 5 ft. long. One end of the pole should be beveled off at 45°, and fastened near the bottom of the vertical board of the scraper. It is also fastened in the notched board. To reinforce the scraper piece, several strips of wood are nailed to it vertically. The scraping edge is shod with a fairly sharp strip of sheet iron or steel.—F. W. Buerstatte, Pullman, Wash.



For Removing Ordinary Falls of Snow, a Homemade Scraper of This Type Is Practical

A Simple Sash Lock for Open Windows

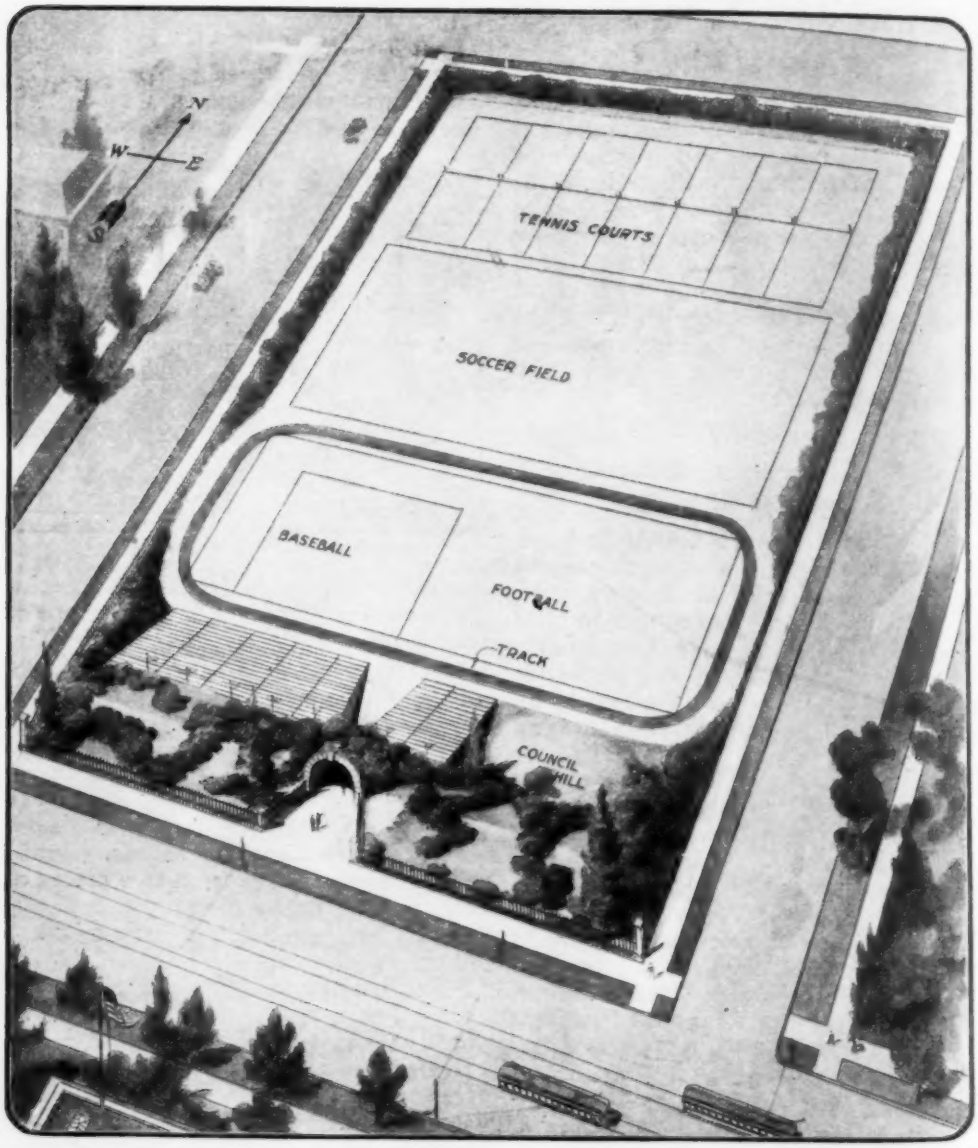
A window lock for sashes, opened partly, can be made from two pieces of No. 14 gauge steel, 1 by 1½ in. long, as shown. The bottom piece has a flat-head ¼-in. bolt riveted in the center, and two screw and two rivet holes in it. The top piece, of spring steel, is ⅜ in. longer than the bottom piece and is riveted on one end to the bottom piece and bent upward. A slot is drilled through the center for the bolt. A wing nut on the bolt forces the top piece against the sash. The lock is set on the side stiles of the sash. The window can be left open as desired, and when the lock is tightened, it holds the sash firmly.



December

NOTICE TO READER: When you finish reading this magazine place a 1-cent stamp on this notice, hand same to any postal employe and it will be placed in the hands of our soldiers or sailors

ATHLETIC FIELD ARTISTICALLY INCLOSED



THE use of unsightly board fences or cement walls have been entirely avoided as a means of inclosing high-school athletic grounds, situated in the midst of a fine residence district in Oak Park, Ill., by substituting therefor walls of artistic shrubbery, some of which cover a high earth embankment. The latter extends across the end of the grounds adjacent to the area devoted to baseball, track work, and football. Besides shutting off the view of passers-by at this end, it supports seats on its inner slope that take the place of the customary unattractive bleachers. Access to these is gained through an artistic archway adjoining which are ticket booths. Parts of the grounds are occupied by a soccer field and tennis courts. An ornamental fence supplements the shrubs as a barrier against intruders. Drinking fountains have been installed at various points.

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